



ThinkSystem SD650 V3 Neptune DWC Tray User Guide



Machine Types: 7D7M

Note

Before using this information and the product it supports, be sure to read and understand the safety information and the safety instructions, which are available at:

https://pubs.lenovo.com/safety_documentation/

In addition, be sure that you are familiar with the terms and conditions of the Lenovo warranty for your server, which can be found at:

<http://datacentersupport.lenovo.com/warrantylookup>

First Edition (August 2022)

© Copyright Lenovo 2022.

LIMITED AND RESTRICTED RIGHTS NOTICE: If data or software is delivered pursuant to a General Services Administration (GSA) contract, use, reproduction, or disclosure is subject to restrictions set forth in Contract No. GS-35F-05925.

Contents

Contents i

Safety iii

Safety inspection checklist iv

Chapter 1. ThinkSystem SD650 V3, Types 7D7M 1

Features. 1

Tech Tips 3

Security advisories 3

Specifications 3

 Technical specifications. 4

 Mechanical specifications 8

 Environmental specifications 8

 Particulate contamination 10

Management options. 11

Chapter 2. Server components 15

Front view 15

Top view 16

KVM breakout cable 16

System-board layout (compute node) 17

 System-board connectors 17

 System-board switches 18

PCIe slot numbering 20

System LEDs and diagnostics display 20

Chapter 3. Parts list 21

Power cords 23

Chapter 4. Unboxing and setup 25

Solution package contents 25

Identify the solution and access the Lenovo XClarity Controller 25

Solution setup checklist 28

Chapter 5. Hardware replacement procedures 31

Installation Guidelines 31

 Safety inspection checklist. 32

 System reliability guidelines 33

 Handling static-sensitive devices 34

Memory module installation rules and order 34

 DRAM DIMMs installation order. 36

 DRAM DIMMs installation order for Intel® Xeon® CPU Max processor 38

Gap pad/Putty pad identification and location 40

Power on and power off the solution. 44

 Power on the solution. 44

 Power off the solution 44

Replace components in the tray 45

 DWC tray replacement 45

 Tray cover replacement 48

 Cross braces replacement 50

 Water loop replacement (trained technician only) 53

Replace components in the compute node 76

 CMOS battery (CR2032) replacement 77

 DIMM comb replacement 81

 Drive and drive cage assembly replacement 85

 7mm NVMe drive and drive cage assembly replacement 100

 E3.s drive and drive cage assembly replacement 112

 KVM cover replacement. 128

 M.2 backplane assembly replacement 130

 M.2 drive replacement 138

 Memory module replacement 141

 PCIe adapter replacement 151

 PCIe riser assembly replacement (ConnectX-6) 156

 PCIe riser assembly replacement (ConnectX-7 NDR 200) 165

 PCIe riser assembly replacement (ConnectX-7 NDR 400) 175

 Power distribution board replacement (trained technician only) 185

 Processor replacement (trained technician only) 198

 System board replacement (trained technician only) 217

Complete the parts replacement 230

Chapter 6. Internal cable routing . . .233

PCIe adapter in compute node cable routing 233

Chapter 7. System configuration . . .237

Set the network connection for the Lenovo XClarity Controller 237

Set USB port for Lenovo XClarity Controller connection. 238

Update the firmware 239

Configure the firmware 242

Memory module configuration 243

Enable Software Guard Extensions (SGX). 244

RAID configuration 244

PSU configuration 245

Deploy the operating system	246
Back up the server configuration	247
Enable Intel® On Demand	247
Enable Intel® On Demand Troubleshooting	257
Guidance on mixing trays configuration for the DW612S enclosure	257

Chapter 8. Problem determination261

Event logs	261
Troubleshooting by system LEDs and diagnostics display	263
Front LEDs	263
External Diagnostics Handset	264
System Management Module 2 (SMM 2) LEDs	270
Power supply LEDs	272
DWC power supply LEDs	273
Drip sensor LED	274
System-board LEDs	275
General problem determination procedures	276
Resolving suspected power problems	276
Resolving suspected Ethernet controller problems	277
Troubleshooting by symptom	278
Intermittent problems	278
Keyboard, mouse, KVM switch or USB-device problems	279
Memory problems	280
Monitor and video problems	282

Network problems	283
Observable problems	284
Optional-device problems	286
Power on and power off problems	287
Power problems	289
Serial-device problems	289
Software problems	289
Storage drive problems	290
System Management Module 2 problems	290
Water leak problems	291

Appendix A. Getting help and technical assistance297

Before you call	297
Collecting service data	298
Contacting Support	299

Appendix B. Documents and supports301

Documents download	301
Support websites	301

Appendix C. Notices.303

Trademarks	304
Important notes	304
Electronic emission notices	304
Taiwan region BSMI RoHS declaration	305
Taiwan Region import and export contact information	305

Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الأمنية

Antes de instalar este produto, leia as Informações de Segurança.

在安裝本产品之前，请仔细阅读 Safety Information（安全信息）。

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

Ennen kuin asennat tämän tuotteen, lue turvaohjeet kohdasta Safety Information.

Avant d'installer ce produit, lisez les consignes de sécurité.

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

Πριν εγκαταστήσετε το προϊόν αυτό, διαβάστε τις πληροφορίες ασφάλειας (safety information).

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

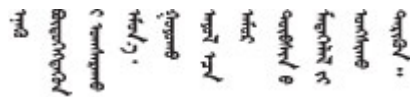
A termék telepítése előtt olvassa el a Biztonsági előírásokat!

Prima di installare questo prodotto, leggere le Informazioni sulla Sicurezza.

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

Пред да се инсталира овој продукт, прочитајте информацијата за безбедност.



Les sikkerhetsinformasjonen (Safety Information) før du installerer dette produktet.

Przed zainstalowaniem tego produktu, należy zapoznać się z książką "Informacje dotyczące bezpieczeństwa" (Safety Information).

Antes de instalar este produto, leia as Informações sobre Segurança.

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítajte Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

Antes de instalar este producto, lea la información de seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

ཐོན་ཁུངས་འདི་བདེ་སྤྱད་མ་བྱས་གོང་། སྐྱོར་གྱི་ཡིད་གཟབ་
བྱ་འདྲ་མིན་ཡིད་པའི་འོད་མེར་བཟང་དགོས།

Bu ürünü kurmadan önce güvenlik bilgilerini okuyun.

مەزكۇر مەھسۇلاتنى ئورنىتىشتىن بۇرۇن بىخەتەرلىك ئۇچۇرلىرىنى ئوقۇپ چىقىڭ.

Youq mwngz yungh canjbinj neix gaxgonq, itdingh aeu doeg aen
canjbinj soengq cungj vahgangj ancien siusik.

Safety inspection checklist

Use the information in this section to identify potentially unsafe conditions with your server. As each machine was designed and built, required safety items were installed to protect users and service technicians from injury.

Note: The product is not suitable for use at visual display workplaces according to §2 of the Workplace Regulations.

Note: The set-up of the server is made in the server room only.

CAUTION:

This equipment must be installed or serviced by trained personnel, as defined by the NEC, IEC 62368-1 & IEC 60950-1, the standard for Safety of Electronic Equipment within the Field of Audio/Video, Information Technology and Communication Technology. Lenovo assumes you are qualified in the servicing of equipment and trained in recognizing hazards energy levels in products. Access to the equipment is by the use of a tool, lock and key, or other means of security, and is controlled by the authority responsible for the location.

Important: Electrical grounding of the server is required for operator safety and correct system function. Proper grounding of the electrical outlet can be verified by a certified electrician.

Use the following checklist to verify that there are no potentially unsafe conditions:

1. Make sure that the power is off and the power cord is disconnected.
2. Check the power cord.
 - Make sure that the third-wire ground connector is in good condition. Use a meter to measure third-wire ground continuity for 0.1 ohm or less between the external ground pin and the frame ground.
 - Make sure that the power cord is the correct type.

To view the power cords that are available for the server:

- a. Go to:

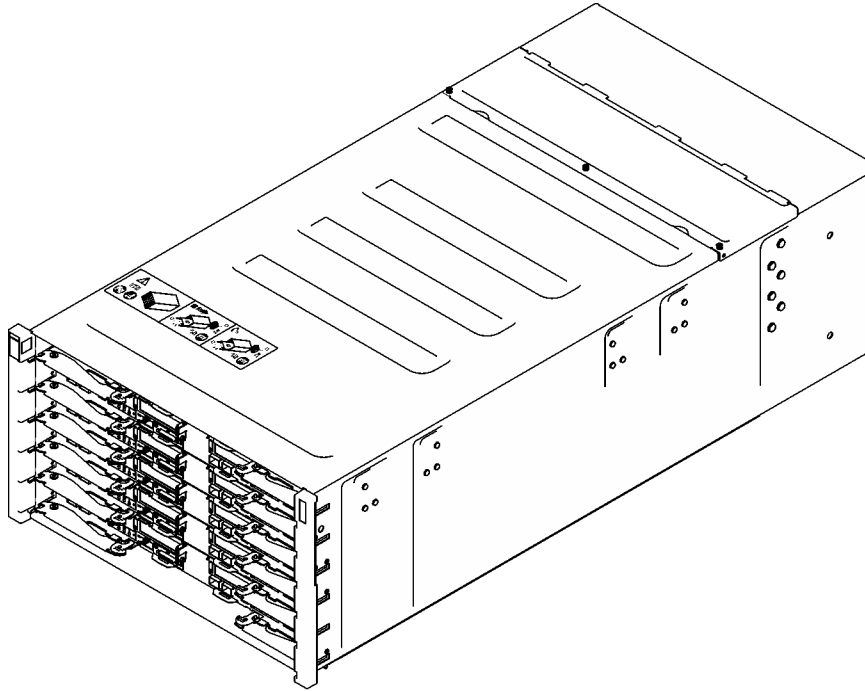
<http://dcsc.lenovo.com/#/>

- b. Click **Preconfigured Model** or **Configure to order**.
- c. Enter the machine type and model for your server to display the configurator page.
- d. Click **Power → Power Cables** to see all line cords.
 - Make sure that the insulation is not frayed or worn.
3. Check for any obvious non-Lenovo alterations. Use good judgment as to the safety of any non-Lenovo alterations.
4. Check inside the server for any obvious unsafe conditions, such as metal filings, contamination, water or other liquid, or signs of fire or smoke damage.
5. Check for worn, frayed, or pinched cables.
6. Make sure that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.

Chapter 1. ThinkSystem SD650 V3, Types 7D7M

The ThinkSystem SD650 V3 is designed to deliver a dense, scalable platform for distributed enterprise and hyperconverged solutions.

Note: The SD650 V3 tray contains two compute nodes.



SD650 V3

Figure 1. Enclosure with six SD650 V3 trays installed

Features

Performance, ease of use, reliability, and expansion capabilities were key considerations in the design of your solution. These design features make it possible for you to customize the system hardware to meet your needs today and provide flexible expansion capabilities for the future.

Your solution implements the following features and technologies:

- **Features on Demand**

If a Features on Demand feature is integrated in the solution or in an optional device that is installed in the solution, you can purchase an activation key to activate the feature. For information about Features on Demand, see:

<https://fod.lenovo.com/lkms>

Intel® On Demand is a feature that allows user to customize processor capabilities according to workload and tasks at hand. For more information, see [“Enable Intel® On Demand” on page 247](#).

- **Lenovo XClarity Controller (XCC)**

The Lenovo XClarity Controller is the common management controller for Lenovo ThinkSystem server hardware. The Lenovo XClarity Controller consolidates multiple management functions in a single chip on the server system board. Some of the features that are unique to the Lenovo XClarity Controller are enhanced performance, higher-resolution remote video, and expanded security options.

The server supports Lenovo XClarity Controller 2 (XCC2). For additional information about Lenovo XClarity Controller 2 (XCC2), refer to <https://pubs.lenovo.com/lxcc-overview/>.

- **UEFI-compliant server firmware**

Lenovo ThinkSystem firmware is Unified Extensible Firmware Interface (UEFI) compliant. UEFI replaces BIOS and defines a standard interface between the operating system, platform firmware, and external devices.

Lenovo ThinkSystem solutions are capable of booting UEFI-compliant operating systems, BIOS-based operating systems, and BIOS-based adapters as well as UEFI-compliant adapters.

Note: The solution does not support Disk Operating System (DOS).

- **Active Memory**

The Active Memory feature improves the reliability of memory through memory mirroring. Memory mirroring mode replicates and stores data on two pairs of DIMMs within two channels simultaneously. If a failure occurs, the memory controller switches from the primary pair of memory DIMMs to the backup pair of DIMMs.

- **Large system-memory capacity**

The solution supports synchronous dynamic random-access memory (SDRAM) registered dual inline memory modules (DIMMs) with error correcting code (ECC). For more information about the specific types and maximum amount of memory, see [“Technical specifications” on page 4](#).

- **Integrated network support**

The tray comes with an integrated 1-port Gigabit Ethernet controller with RJ-45 connector and 2-port 25Gb Ethernet controller with SFP28 connector, which support connection to a 1000 Mbps network.

- **Large data-storage capacity**

The simple-swap solution models support the following drives:

- Supports up to four 7 mm simple-swap SATA / NVMe solid-state drives (SSD) per node.
- Supports up to two 15 mm simple-swap SATA / NVMe solid-state drive (SSD) per node.
- Supports up to two E3.S simple-swap NVMe solid-state drive (SSD) per node.
- Supports one M.2 drive per node. (Requires the M.2 interposer assembly)

- **Lightpath Diagnostics**

Lightpath Diagnostics provides LEDs to help you diagnose problems. For more information about the Lightpath Diagnostics, see [“Troubleshooting by system LEDs and diagnostics display” on page 263](#).

- **Mobile access to Lenovo Service Information website**

The solution provides a QR code on the system service label, which is on the cover of the DWC tray cover, that you can scan using a QR code reader and scanner with a mobile device to get quick access to the Lenovo Service Information website. The Lenovo Service Information website provides additional information for parts installation, replacement videos, and error codes for solution support.

- **Active Energy Manager**

Lenovo XClarity Energy Manager is a power and temperature management solution for data centers. You can monitor and manage the power consumption and temperature of Converged, NeXtScale, System x, and ThinkServer solutions, and improve energy efficiency using Lenovo XClarity Energy Manager.

- **Optional power capabilities**

The solution supports a maximum of nine 2400W or 2600W hot-swap power supplies, or three 7200W DWC PSUs.

Note: Do not mix power supplies in the same unit of solution.

- **ThinkSystem RAID support**

The ThinkSystem RAID provides software RAID and on-board hardware RAID support for RAID level 0, 1, 5, and 10.

Tech Tips

Lenovo continually updates the support website with the latest tips and techniques that you can use to solve issues that your server might encounter. These Tech Tips (also called retain tips or service bulletins) provide procedures to work around issues or solve problems related to the operation of your server.

To find the Tech Tips available for your server:

1. Go to <http://datacentersupport.lenovo.com> and navigate to the support page for your server.
2. Click on **How To's** from the navigation pane.
3. Click **Article Type → Solution** from the drop-down menu.

Follow the on-screen instructions to choose the category for the problem that you are having.

Security advisories

Lenovo is committed to developing products and services that adhere to the highest security standards in order to protect our customers and their data. When potential vulnerabilities are reported, it is the responsibility of the Lenovo Product Security Incident Response Team (PSIRT) to investigate and provide information to our customers so they may put mitigation plans in place as we work toward providing solutions.

The list of current advisories is available at the following site:

https://datacentersupport.lenovo.com/product_security/home

Specifications

Summary of the features and specifications of the solution. Depending on the model, some features might not be available, or some specifications might not apply.

Notes:

- The 6U enclosure supports up to six trays.
- Each tray contains two nodes; one left node and one right node (when viewed from front of enclosure).
- SD650 V3 tray contains two compute nodes.

Refer to the below table for specifications categories and the content of each category.

Specification category	Technical specifications	Mechanical specifications	Environmental specifications
Content	<ul style="list-style-type: none"> • Processor • Memory • Storage expansion • Expansion slots • Integrated functions and I/O connectors • Network • Storage controllers • Electrical input • Minimal configuration for debugging • Operating systems 	<ul style="list-style-type: none"> • Dimension • Weight 	<ul style="list-style-type: none"> • Acoustical noise emissions • Environment • Water requirements

Technical specifications

Summary of the technical specifications of solution. Depending on the model, some features might not be available, or some specifications might not apply.

Notes:

- The 6U enclosure supports up to six trays.
- Each tray contains two nodes; one left node and one right node (when viewed from front of enclosure).
- SD650 V3 tray contains two compute nodes.

Processor
<ul style="list-style-type: none"> • Supports two 4th Gen Intel® Xeon® Scalable processors per node. • Supports processors with up to 60 cores, base speeds up to 3.7 GHz, and TDP ratings up to 350W. • Intel® Xeon® CPU Max processors <ul style="list-style-type: none"> – For more information on Intel® Xeon® CPU Max operating system support, see Intel® Xeon® CPU Max operating systems support. • UPI links at higher width (x24) and speed: 12.8, 14.4 and 16 GT/s. <ul style="list-style-type: none"> – SD650 V3 supports 4 UPI • New Socket Technology (Socket E with PCIe 5.0) LGA4677. <p>Notes:</p> <ol style="list-style-type: none"> 1. Use the Setup Utility to determine the type and speed of the processors in the node. 2. For a list of supported processors, see https://serverproven.lenovo.com.

Memory

See “[Memory module installation rules and order](#)” on page 34 for detailed information about memory configuration and setup.

- Slots:
 - 16 DIMM slots per node, 8 DIMMs per processor.
 - Type:
 - Lenovo DDR5 at up to 4800 MT/s
 - Protection:
 - ECC
 - SDDC (for x4-based memory DIMMs)
 - ADDDC (for x4-based memory DIMMs)
 - Memory mirroring
 - Supports (depending on the model):
 - 16 GB, 32 GB, and 64 GB ECC RDIMM
 - 128 GB 3DS RDIMM
- Note:** 16 GB ECC RDIMM is SD650 V3 only.
- Minimum:
 - 256 GB per node with sixteen 16 GB RDIMMs per node.
 - Maximum:
 - Up to 1 TB memory with sixteen 64 GB RDIMMs per node.
 - Up to 2 TB memory with sixteen 128 GB 3DS RDIMMs per node.

Important:

- The tray only supports fully populated processor and memory configuration (2 processors and 16 DIMMs per node).
- Mixing DIMM speed is not supported.
- ADDDC not supported for 9x4 ECC DIMM (Value)

Storage expansion

- Supports up to four 7 mm simple-swap SATA / NVMe solid-state drives (SSD) per node.
- Supports up to two 15 mm simple-swap SATA / NVMe solid-state drive (SSD) per node.
- Supports up to two E3.S simple-swap NVMe solid-state drive (SSD) per node.
- Supports one M.2 drive per node. (Requires the M.2 interposer assembly)

For a list of supported M.2 drives, see <https://serverproven.lenovo.com>.

Attention: As a general consideration, do not mix standard 512-byte and advanced 4-KB format drives in the same RAID array because it might lead to potential performance issues.

Expansion slots

- Two PCIe 5.0 x16 PCIe slots on the front per node, supports one of the following:
 - Supports up to two 75W Half-Height Half-Length PCIe 5.0 x16 PCIe adapters with riser card. (Mutually exclusive with internal storage drives)

Integrated functions and I/O connectors

- Lenovo XClarity Controller (XCC), which provides service processor control and monitoring functions, video controller, and remote keyboard, video, mouse, and remote drive capabilities.
 - The server supports Lenovo XClarity Controller 2 (XCC2). For additional information about Lenovo XClarity Controller 2 (XCC2), refer to <https://pubs.lenovo.com/lxcc-overview/>.

- Front operator panel

- KVM breakout cable connector

The KVM breakout cable includes VGA connector, serial port connector, and USB 3.0 (5 Gbps) / 2.0 connector. XCC mobile management is supported by USB 2.0 connector on the KVM breakout cable only.

For more information, see “KVM breakout cable” on page 16.

- External LCD diagnostics handset connector
- One Gigabit Ethernet port with RJ45 connector, shared between operating system and Lenovo XClarity Controller.
- Two 25Gb SFP28 ports. One port is shared between operating system and Lenovo XClarity Controller.

Note: Lenovo XClarity Controller connection is mutually exclusive between RJ45 Ethernet connector and 25Gb SFP28 Port 1.

- Video controller (integrated into Lenovo XClarity Controller)
 - ASPEED
 - SVGA compatible video controller
 - Avocent Digital Video Compression
 - Video memory is not expandable

Note: Maximum video resolution is 1920 x 1200 at 60 Hz.

- Hot-swappable System Management Module 2 (SMM2)

Note: See https://pubs.lenovo.com/mgt_tools_smm2/ for more details about System Management Module.

Network

DW612S Enclosure

10/100/1000 Mb Ethernet port dedicated for System Management Module (SMM2).

Compute node

- One Gigabit Ethernet port with RJ45 connector, shared between operating system and Lenovo XClarity Controller.
- Two 25Gb SFP28 ports. One port is shared between operating system and Lenovo XClarity Controller.

Lenovo XClarity Controller connection is mutually exclusive between RJ45 Ethernet connector and 25Gb SFP28 Port 1.

Storage controllers

- 6 Gbps SATA:
 - Onboard SATA AHCI (non-RAID)
 - RAID 0, 1, 5, 10 with onboard SATA RAID (Intel RSTe)
- PCIe x4 NVMe:
 - Onboard NVMe
 - Intel VROC Premium, supports Raid 0, 1, 5, 10 based on storage configuration.

Electrical input

SD650 V3 tray installed in DW612S enclosure

- Supports six or nine hot-swap 2400W or 2600W AC power supplies.
 - Sine-wave input (50-60 Hz) required
 - Input voltage for 2400W power supplies:
 - 200-240 Vac, 240 Vdc
 - Input voltage for 2600W power supplies:
 - 200-208 Vac, 240 Vdc (output up to 2400W only)
 - 208-240 Vac, 240 Vdc
 - Six power supplies: 5+1 with oversubscription, or Non-redundancy
 - Nine power supplies: 8+1 without oversubscription

Note: Mixing PSUs manufactured by different vendors is not supported.

- Supports two or three hot-swap DWC 7200W power supplies.
 - Input voltage:
 - 200-208 Vac (work as 6900W)
 - 220-240 Vac, 240 Vdc (work as 7200W)
 - Two DWC PSUs: work as 5+1 with oversubscription, or Non-redundancy
 - Three DWC PSUs: work as 8+1 without oversubscription

CAUTION:

Power supplies and redundant power supplies in the enclosure must be with the same brand, power rating, wattage or efficiency level.

Note: Refer to https://thinksystem.lenovofiles.com/help/topic/mgt_tools_smm2/c_overview.html for more details of solution power status.

Minimal configuration for debugging

SD650 V3 tray installed in DW612S enclosure

- One DW612S Enclosure
- One SD650 V3 tray (with two compute nodes)
- Two processors per node
- 16 DIMMs per node
- Two CFF v4 power supplies (2400W or above) or one DWC PSU
- One drive (any type) (If OS is needed for debugging)

Operating systems

Supported and certified operating systems:

- Red Hat Enterprise Linux
- SUSE Linux Enterprise Server

References:

- Complete list of available operating systems: <https://lenovopress.lenovo.com/osig>.
- OS deployment instructions, see “Deploy the operating system” on page 246.
- For more information on Intel® Xeon® CPU Max operating system support, see [Intel® Xeon® CPU Max operating systems support](#).

Mechanical specifications

Summary of the mechanical specifications of solution. Depending on the model, some features might not be available, or some specifications might not apply.

Notes:

- The 6U enclosure supports up to six trays.
- Each tray contains two nodes; one left node and one right node (when viewed from front of enclosure).
- SD650 V3 tray contains two compute nodes.

Dimension
<ul style="list-style-type: none">• Height: 41.0 mm (1.61 inches)• Depth: 746.7 mm (29.40 inches)• Width: 437.5 mm (17.22 inches)

Weight
SD650 V3 Tray: <ul style="list-style-type: none">• Weight estimation: 20.70 kg (45.60 lbs)• Enclosure with six SD650 V3 trays and three DWC PSU: approximately 168.34 kg (371.19 lbs)

Environmental specifications

Summary of the environmental specifications of solution. Depending on the model, some features might not be available, or some specifications might not apply.

Notes:

- The 6U enclosure supports up to six trays.
- Each tray contains two nodes; one left node and one right node (when viewed from front of enclosure).
- SD650 V3 tray contains two compute nodes.

Acoustical noise emissions
SD650 V3 Tray: <ul style="list-style-type: none">• Sound power level (LWAd):<ul style="list-style-type: none">– Idle: 6.5 Bel– Operation: 7.7 Bel Notes: <ul style="list-style-type: none">• These levels were measured in controlled acoustical environments according to procedures specified by ISO 7779, and are reported in accordance with ISO 9296.• The declared acoustic noise levels are based on specified configurations (one enclosure with 6 PSUs), and may change depending on configuration/condition changes.• Government regulations (such as those prescribed by OSHA or European Community Directives) may govern noise level exposure in the workplace and may apply to you and your server installation. The actual sound pressure levels in your installation depend upon a variety of factors, including the number of racks in the installation; the size, materials, and configuration of the room; the noise levels from other equipment; the room ambient temperature, and employee's location in relation to the equipment. Further, compliance with such government regulations depends on a variety of additional factors, including the duration of employees' exposure and whether employees wear hearing protection. Lenovo recommends that you consult with qualified experts in this field to determine whether you are in compliance with the applicable regulations.

Environment

- Air temperature requirements:
 - Operating:
 - ASHRAE class A2: 10°C - 35°C (50°F - 95°F); when the altitude exceeds 900 m (2953 ft), the maximum ambient temperature value decreases by 1°C (1.8°F) with every 300 m (984 ft) of altitude increase.
 - Powered off: 5°C - 45°C (41°F - 113°F)
 - Shipping/storage: -40°C - 60°C (-40°F - 140°F)
- Relative humidity (non-condensing):
 - Operating: ASHRAE Class A2: 8% - 80%, maximum dew point : 21°C (70°F)
 - Shipment/storage: 8% - 90%
- Maximum altitude: 3048 m (10 000 ft)

Note: The solution is designed for standard data center environment and recommended to be placed in industrial data center.

Water requirements

6900W (200-208 Vac) DWC power supply

- Water temperature:
 - ASHRAE class W+: up to 50°C (122°F) inlet temperature to the rack
- Maximum pressure: 4.4 bars
- Minimum water flow rate: 1.0 liters per minute per power supply
 - For inlet water temperatures up to 45°C (113°F), 1.0 liters per minute per power supply
 - For inlet water temperatures between 45°C - 50°C (113°F - 122°F), 1.5 liters per minute per power supply

7200W (220-240 Vac and 240 Vdc) DWC power supply

- Water temperature:
 - ASHRAE class W+: up to 50°C (122°F) inlet temperature to the rack
- Maximum pressure: 4.4 bars
- Minimum water flow rate: 1.5 liters per minute per power supply
 - For inlet water temperatures up to 45°C (113°F), 1.5 liters per minute per power supply
 - For inlet water temperatures between 45°C - 50°C (113°F - 122°F), 2.0 liters per minute per power supply

SD650 V3

- Water temperature:
 - ASHRAE class W45: up to 45°C (113°F) inlet temperature to the rack
- Maximum pressure: 4.4 bars
- Minimum water flow rate: 6.0 liters per minute per enclosure, assuming 1.0 liters per minute per compute tray with 6 trays per enclosure (1 tray consists of 2 compute nodes)
 - For processors below 300W: 7.5 liters per minute per enclosure, assuming 1.25 liters per minute per compute tray with 6 trays per enclosure
 - For processors 300W and above: 9.0 liters per minute per enclosure, assuming 1.5 liters per minute per compute tray with 6 trays per enclosure
 - For Intel® Xeon® Platinum 6458Q and 8470Q processors: 18 liters per minute per enclosure, assuming 3.0 liters per minute per compute tray with 6 trays per enclosure
 - For Intel® Xeon® 8593Q and 6558Q processors: 18 liters per minute per enclosure, assuming 3.0 liters per minute per compute tray with 6 trays per enclosure.
 - For Intel® Xeon® CPU Max processors:
 - 9480/9470 processors: 18 liters per minute per enclosure, assuming 3.0 liters per minute per compute tray with 6 trays per enclosure
 - 9468/9460/9462 processors: 12 liters per minute per enclosure, assuming 2.0 liters per minute per compute tray with 6 trays per enclosure

Note: The water required to initially fill the system side cooling loop must be reasonably clean, bacteria-free water (<100 CFU/ml) such as de-mineralized water, reverse osmosis water, de-ionized water, or distilled water. The water must be filtered with an in-line 50 micron filter (approximately 288 mesh). The water must be treated with anti-biological and anti-corrosion measures.

Particulate contamination

Attention: Airborne particulates (including metal flakes or particles) and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the device that is described in this document.

Risks that are posed by the presence of excessive particulate levels or concentrations of harmful gases include damage that might cause the device to malfunction or cease functioning altogether. This specification sets forth limits for particulates and gases that are intended to avoid such damage. The limits must not be viewed or used as definitive limits, because numerous other factors, such as temperature or moisture content of the air, can influence the impact of particulates or environmental corrosives and gaseous contaminant transfer. In the absence of specific limits that are set forth in this document, you must implement practices that maintain particulate and gas levels that are consistent with the protection of human health and safety. If Lenovo determines that the levels of particulates or gases in your environment have caused damage to the device, Lenovo may condition provision of repair or replacement of devices or parts on implementation of appropriate remedial measures to mitigate such environmental contamination. Implementation of such remedial measures is a customer responsibility.

Table 1. Limits for particulates and gases

Contaminant	Limits
Reactive gases	<p>Severity level G1 as per ANSI/ISA 71.04-1985¹:</p> <ul style="list-style-type: none"> The copper reactivity level shall be less than 200 Angstroms per month ($\text{\AA}/\text{month} \approx 0.0039 \mu\text{g}/\text{cm}^2\text{-hour weight gain}$).² The silver reactivity level shall be less than 200 $\text{\AA}/\text{month}$ ($\text{\AA}/\text{month} \approx 0.0035 \mu\text{g}/\text{cm}^2\text{-hour weight gain}$).³ The reactive monitoring of gaseous corrosivity must be conducted approximately 5 cm (2 in.) in front of the rack on the air inlet side at one-quarter and three-quarter frame height off the floor or where the air velocity is much higher.
Airborne particulates	<p>Data centers must meet the cleanliness level of ISO 14644-1 class 8.</p> <p>For data centers without airside economizer, the ISO 14644-1 class 8 cleanliness might be met by choosing one of the following filtration methods:</p> <ul style="list-style-type: none"> The room air might be continuously filtered with MERV 8 filters. Air entering a data center might be filtered with MERV 11 or preferably MERV 13 filters. <p>For data centers with airside economizers, the choice of filters to achieve ISO class 8 cleanliness depends on the specific conditions present at that data center.</p> <ul style="list-style-type: none"> The deliquescent relative humidity of the particulate contamination should be more than 60% RH.⁴ Data centers must be free of zinc whiskers.⁵
<p>¹ ANSI/ISA-71.04-1985. <i>Environmental conditions for process measurement and control systems: Airborne contaminants</i>. Instrument Society of America, Research Triangle Park, North Carolina, U.S.A.</p> <p>² The derivation of the equivalence between the rate of copper corrosion growth in the thickness of the corrosion product in $\text{\AA}/\text{month}$ and the rate of weight gain assumes that Cu_2S and Cu_2O grow in equal proportions.</p> <p>³ The derivation of the equivalence between the rate of silver corrosion growth in the thickness of the corrosion product in $\text{\AA}/\text{month}$ and the rate of weight gain assumes that Ag_2S is the only corrosion product.</p> <p>⁴ The deliquescent relative humidity of particulate contamination is the relative humidity at which the dust absorbs enough water to become wet and promote ionic conduction.</p> <p>⁵ Surface debris is randomly collected from 10 areas of the data center on a 1.5 cm diameter disk of sticky electrically conductive tape on a metal stub. If examination of the sticky tape in a scanning electron microscope reveals no zinc whiskers, the data center is considered free of zinc whiskers.</p>	

Management options

The XClarity portfolio and other system management options described in this section are available to help you manage the servers more conveniently and efficiently.

Overview

Options	Description
Lenovo XClarity Controller	<p>Baseboard management controller (BMC)</p> <p>Consolidates the service processor functionality, Super I/O, video controller, and remote presence capabilities into a single chip on the server system board (system board assembly).</p> <p>Interface</p> <ul style="list-style-type: none"> • CLI application • Web GUI interface • Mobile application • Redfish API <p>Usage and downloads</p> <p>https://pubs.lenovo.com/lxcc-overview/</p>
Lenovo XCC Logger Utility	<p>Application that reports the XCC events to local OS system log.</p> <p>Interface</p> <ul style="list-style-type: none"> • CLI application <p>Usage and downloads</p> <ul style="list-style-type: none"> • https://pubs.lenovo.com/lxcc-logger-linux/ • https://pubs.lenovo.com/lxcc-logger-windows/
Lenovo XClarity Administrator	<p>Centralized interface for multi-server management.</p> <p>Interface</p> <ul style="list-style-type: none"> • Web GUI interface • Mobile application • REST API <p>Usage and downloads</p> <p>http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/aug_product_page.html</p>
Lenovo XClarity Essentials toolset	<p>Portable and light toolset for server configuration, data collection, and firmware updates. Suitable both for single-server or multi-server management contexts.</p> <p>Interface</p> <ul style="list-style-type: none"> • OneCLI: CLI application • Bootable Media Creator: CLI application, GUI application • UpdateXpress: GUI application <p>Usage and downloads</p> <p>https://pubs.lenovo.com/lxce-overview/</p>

Options	Description
Lenovo XClarity Provisioning Manager	<p>UEFI-based embedded GUI tool on a single server that can simplify management tasks.</p> <p>Interface</p> <ul style="list-style-type: none"> • Web interface (BMC remote access) • GUI application <p>Usage and downloads</p> <p>https://pubs.lenovo.com/lxpm-overview/</p> <p>Important: Lenovo XClarity Provisioning Manager (LXPM) supported version varies by product. All versions of Lenovo XClarity Provisioning Manager are referred to as Lenovo XClarity Provisioning Manager and LXPM in this document, unless specified otherwise. To see the LXPM version supported by your server, go to https://pubs.lenovo.com/lxpm-overview/.</p>
Lenovo XClarity Integrator	<p>Series of applications that integrate the management and monitoring functionalities of the Lenovo physical servers with the software used in a certain deployment infrastructure, such as VMware vCenter, Microsoft Admin Center, or Microsoft System Center while delivering additional workload resiliency.</p> <p>Interface</p> <ul style="list-style-type: none"> • GUI application <p>Usage and downloads</p> <p>https://pubs.lenovo.com/lxci-overview/</p>
Lenovo XClarity Energy Manager	<p>Application that can manage and monitor server power and temperature.</p> <p>Interface</p> <ul style="list-style-type: none"> • Web GUI Interface <p>Usage and downloads</p> <p>https://datacentersupport.lenovo.com/solutions/Invo-lxem</p>
Lenovo Capacity Planner	<p>Application that supports power consumption planning for a server or rack.</p> <p>Interface</p> <ul style="list-style-type: none"> • Web GUI Interface <p>Usage and downloads</p> <p>https://datacentersupport.lenovo.com/solutions/Invo-lcp</p>
System Management Module 2 (ThinkSystem high-density servers only)	<p>A hot-swap enclosure management module that helps you easily manage the system power supplies and fan speeds. It monitors the fan, power and enclosure status with event logs.</p> <p>Interface</p> <ul style="list-style-type: none"> • Web GUI Interface <p>Usage and downloads</p> <p>https://pubs.lenovo.com/mgt_tools_smm2/</p>

Functions

Options		Functions						
		Multi-system mgmt	OS deployment	System configuration	Firmware updates ¹	Events/alert monitoring	Inventory/logs	Power mgmt
Lenovo XClarity Controller				√	√ ²	√	√ ⁴	
Lenovo XCC Logger Utility						√		
Lenovo XClarity Administrator		√	√	√	√ ²	√	√ ⁴	
Lenovo XClarity Essentials toolset	OneCLI	√		√	√ ²	√	√	
	Bootable Media Creator			√	√ ²		√ ⁴	
	UpdateXpress			√	√ ²			
Lenovo XClarity Provisioning Manager			√	√	√ ³		√ ⁵	
Lenovo XClarity Integrator		√	√ ⁶	√	√	√	√	√ ⁷
Lenovo XClarity Energy Manager		√				√		√
Lenovo Capacity Planner								√ ⁸
System Management Module 2(ThinkSystem high-density servers only)					√	√	√	√

Notes:

1. Most options can be updated through the Lenovo tools. Some options, such as GPU firmware or Omni-Path firmware require the use of supplier tools.
2. The server UEFI settings for option ROM must be set to **Auto** or **UEFI** to update firmware using Lenovo XClarity Administrator, Lenovo XClarity Essentials, or Lenovo XClarity Controller.
3. Firmware updates are limited to Lenovo XClarity Provisioning Manager, Lenovo XClarity Controller, and UEFI updates only. Firmware updates for optional devices, such as adapters, are not supported.
4. The server UEFI settings for option ROM must be set to **Auto** or **UEFI** for detailed adapter card information, such as model name and firmware levels, to be displayed in Lenovo XClarity Administrator, Lenovo XClarity Controller, or Lenovo XClarity Essentials.
5. Limited inventory.
6. The Lenovo XClarity Integrator deployment check for System Center Configuration Manager (SCCM) supports Windows operating system deployment.
7. Power management function is supported only by Lenovo XClarity Integrator for VMware vCenter.
8. It is highly recommended that you check the power summary data for your server using Lenovo Capacity Planner before purchasing any new parts.

Chapter 2. Server components

This section contains information about each of the components associated with the server.

Front view

The following illustration shows the controls, LEDs, and connectors on the front of the solution.

Notes:

- The 6U enclosure supports up to six trays.
- Each tray contains two nodes; one left node and one right node (when viewed from front of enclosure).
- SD650 V3 tray contains two compute nodes.

SD650 V3 tray

The following illustrations show the controls, LEDs, and connectors on the front of each tray.

Note: The illustrations in this document might differ slightly from your hardware.

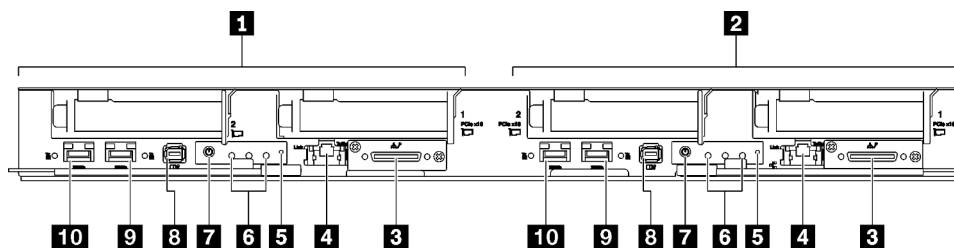


Figure 2. SD650 V3 tray

Attention: Shared I/O configuration requires specific power on and power off sequence for the two nodes, see below:

- Power on sequence: first, power on the node with **main** adapter (right node); then, power on the node with **auxiliary** adapter (left node).
- Power off sequence: first, power off the node with **auxiliary** adapter (left node); then, power off the node with **main** adapter (right node).

Table 2. SD650 V3 tray indicators, controls, and connectors

1 Compute node / Left node (odd bay numbers)	6 Front operator panel LEDs. See “Front LEDs” on page 263 for more information.
2 Compute node / Right node (even bay numbers)	7 Node power button with LED. See “Front LEDs” on page 263 for more information.
3 KVM breakout cable connector The KVM breakout cable includes VGA connector, serial port connector, and USB 3.0 (5 Gbps) / 2.0 connector. XCC mobile management is supported by USB 2.0 connector on the KVM breakout cable only. For more information, see “KVM breakout cable” on page 16 .	8 External Diagnostics Handset connector. See “External Diagnostics Handset” on page 264 for more information.

Table 2. SD650 V3 tray indicators, controls, and connectors (continued)

<p>4 1 Gb RJ45 Ethernet port with share-NIC feature for Lenovo XClarity Controller. See “Front LEDs” on page 263 for more information.</p> <p>Lenovo XClarity Controller connection is mutually exclusive between RJ45 Ethernet connector and 25Gb SFP28 Port 1.</p>	<p>9 25 Gb SFP28 Ethernet port (Port 2). See “Front LEDs” on page 263 for more information.</p>
<p>5 NMI button.</p> <p>Press this button to force a nonmaskable interrupt to the processor. You might have to use a pen or the end of a straightened paper clip to press the button. You can also use it to force a blue-screen memory dump. Use this button only when you are directed to do so by Lenovo Support.</p>	<p>10 25 Gb SFP28 Ethernet port (Port 1) with share-NIC feature for Lenovo XClarity Controller. See “Front LEDs” on page 263 for more information.</p> <p>Lenovo XClarity Controller connection is mutually exclusive between RJ45 Ethernet connector and 25Gb SFP28 Port 1.</p>

Top view

This section contains information on the top view of the solution.

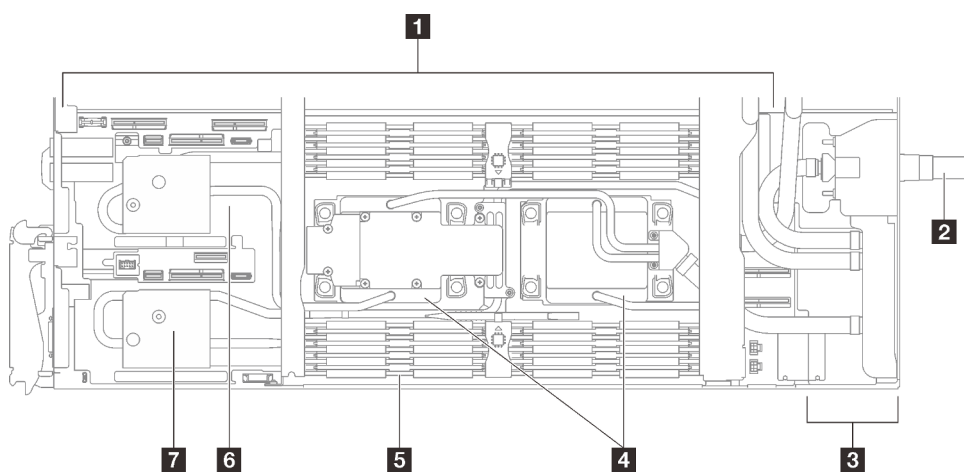


Figure 3. Compute node top view

Table 3. Components on the compute node top view

1 System board	5 Memory module cold plates
2 Water loop quick connect	6 PCIe 5.0 x16 slot 2 or drive bay 0/1
3 Power distribution board	7 PCIe 5.0 x16 slot 1 or drive bay 2/3
4 Processor cold plates	

KVM breakout cable

Use this information for details about the KVM breakout cable.

Use the KVM breakout cable to connect external I/O devices to the compute node. The KVM breakout cable connects through the KVM connector (see [“Front view” on page 15](#)). The KVM breakout cable has

connectors for a display device (video), one USB 3.0 (5 Gbps) connectors for a USB keyboard and mouse, and a serial interface connector.

The following illustration identifies the connectors and components on the KVM breakout cable.

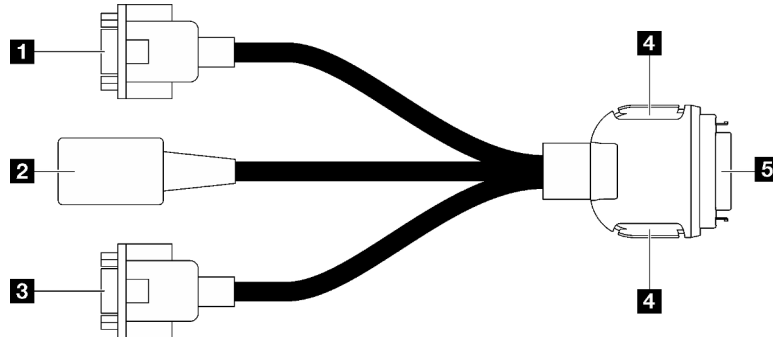


Figure 4. Connectors and components on the KVM breakout cable

Table 4. Connectors and components on the console breakout cable

1 Serial port connector	4 Retention buttons <ul style="list-style-type: none"> Removal—Press the buttons; then, disconnect the KVM breakout cable from the server. Installation—Press the buttons while connecting the KVM breakout cable to the server; then, release the buttons to secure the KVM breakout cable to the chassis.
2 USB 3.0 (5 Gbps) / USB 2.0 connector (XCC mobile management is supported by USB 2.0 connector on the KVM breakout cable only.)	5 connects to KVM connector on the front of the server. See “Front view” on page 15.
3 VGA connector	

System-board layout (compute node)

The illustrations in this section provide information about the connectors, switches, and jumpers that are available on the system board.

For more information about the LEDs that are available on the system board, see [“System-board LEDs” on page 275.](#)

System-board connectors

The following illustrations show the internal connectors on the system board.

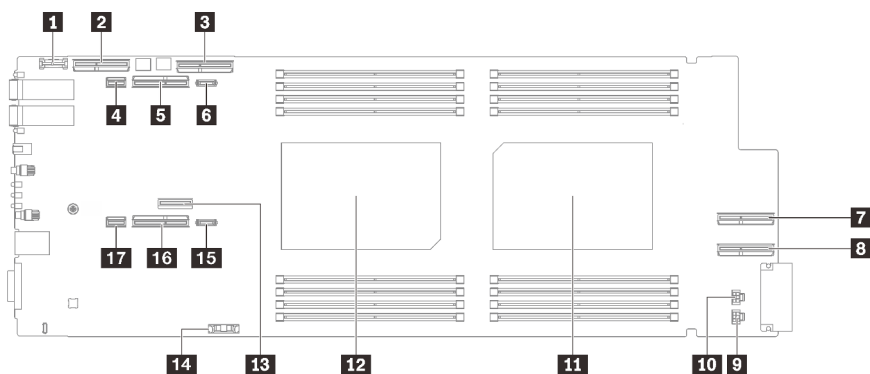


Figure 5. Internal connectors on compute node system board

Table 5. Internal connectors on compute node system board

1 Trusted cryptographic module (TCM) connector	10 Drive power 2 connector
2 PCIe x 16 MCIO 1 connector (reserved)	11 Processor 2 connector
3 PCIe x 16 MCIO 2 connector (reserved)	12 Processor 1 connector
4 SATA 0-1 connector	13 M.2 connector
5 PCIe x16 Gen 5 slot for PCIe riser 2 or NVMe 0-1 connector	14 CMOS battery (CR2032) connector
6 PCIe 2 power connector	15 PCIe 1 power connector
7 PCIe x 16 MCIO 3 connector (reserved)	16 PCIe x16 Gen 5 slot for PCIe riser 1 or NVMe 2-3 connector
8 PCIe x 16 MCIO 4 connector (reserved)	17 SATA 2-3 connector
9 Drive power 1 connector	

The following illustration shows the location of the DIMM slots numbering on the system board of the compute node.

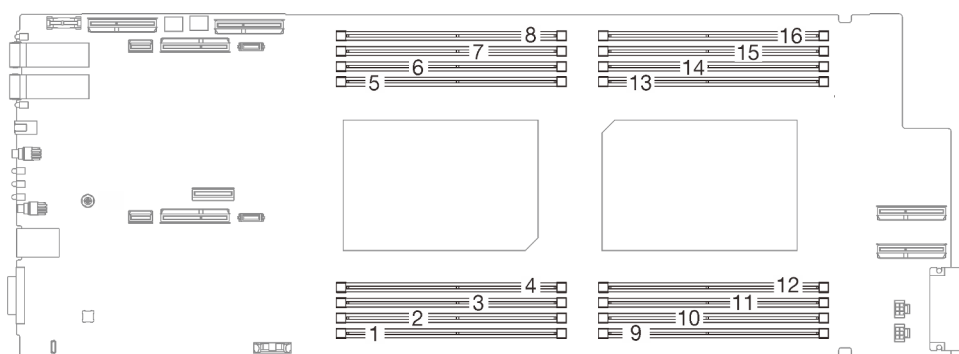


Figure 6. DIMM slots numbering on compute node system board

System-board switches

The following illustration shows the location and description of the switches.

Note: If there is a clear protective sticker on the top of the switch blocks, you must remove and discard it to access the switches.

Important:

1. Before you change any switch settings or move any jumpers, turn off the solution; then, disconnect all power cords and external cables. Review the following information:
 - https://pubs.lenovo.com/safety_documentation/
 - “Installation Guidelines” on page 31
 - “Handling static-sensitive devices” on page 34
 - “Power off the solution” on page 44
2. Any system-board switch or jumper block that is not shown in the illustrations in this document are reserved.

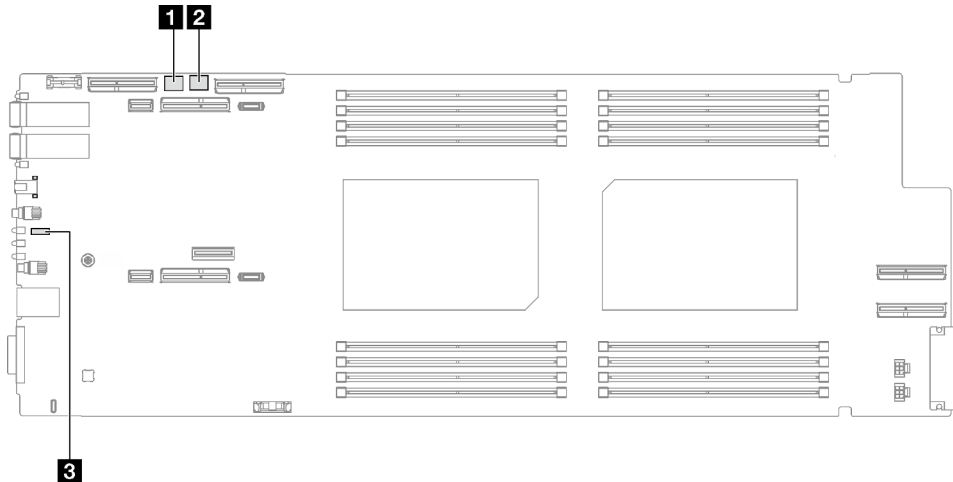


Figure 7. Switches on compute node system board

Table 6. System-board switches

1 SW5 switch block	2 SW13 switch block
3 Jumper 44	

Table 7. SW5 switch block definition

Switch number	Switch name	Usage description	
		On	Off
1	BMC reset	Force hot reset BMC chip	(Default) Normal.
3	Machine Engine (ME) firmware security override	ME update by jumper	(Default) Normal.
4	Password override	Overrides the power-on password	(Default) Normal.

Table 8. SW13 switch block definition

Switch number	Switch name	Usage description	
		On	Off
3	Clear CMOS	Clear CMOS data	(Default) Normal.
5	Serial select	Sends the XCC to the serial port	(Default) Send the serial input output (SIO) to the front serial port.

Table 9. Jumper definition

Switch number	Switch name	Usage description	
		On	Off
44	BMC Boot from Backup	Request XCC to boot using a backup of the XCC firmware	(Default) XCC will boot by using the primary XCC firmware.

PCIe slot numbering

Use this information to identify the PCIe slot numbering.

SD650 V3 tray

Note:

Note: SD650 V3 tray contains two compute nodes.

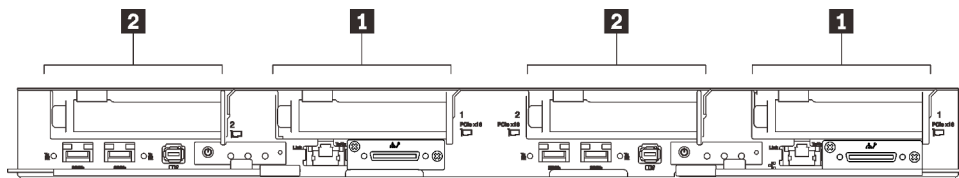


Figure 8. PCIe slot numbering - SD650 V3 tray

1 PCIe slot 1	2 PCIe slot 2
----------------------	----------------------

System LEDs and diagnostics display

See the following section for information on available enclosure LEDs and diagnostics display.

For more information, refer to [“Troubleshooting by system LEDs and diagnostics display” on page 263](#).

Chapter 3. Parts list

Use the parts list to identify each of the components that are available for your solution.

For more information about ordering parts:

1. Go to <http://datacentersupport.lenovo.com> and navigate to the support page for your solution.
2. Click **Parts**.
3. Enter the serial number to view a listing of parts for your solution.

It is highly recommended that you check the power summary data for your solution using Lenovo Capacity Planner before purchasing any new parts.

Note: Depending on the model, your solution might look slightly different from the illustration.

The parts listed in the following table are identified as one of the following:

- **T1:** Tier 1 customer replaceable unit (CRU). Replacement of Tier 1 CRUs is your responsibility. If Lenovo installs a Tier 1 CRU at your request with no service agreement, you will be charged for the installation.
- **T2:** Tier 2 customer replaceable unit (CRU). You may install a Tier 2 CRU yourself or request Lenovo to install it, at no additional charge, under the type of warranty service that is designated for your server.
- **F:** Field replaceable unit (FRU). FRUs must be installed only by trained service technicians.
- **C:** Consumable and Structural parts. Purchase and replacement of consumable and structural parts (components, such as a filler or bezel) is your responsibility. If Lenovo acquires or installs a structural component at your request, you will be charged for the service.

SD650 V3 parts list

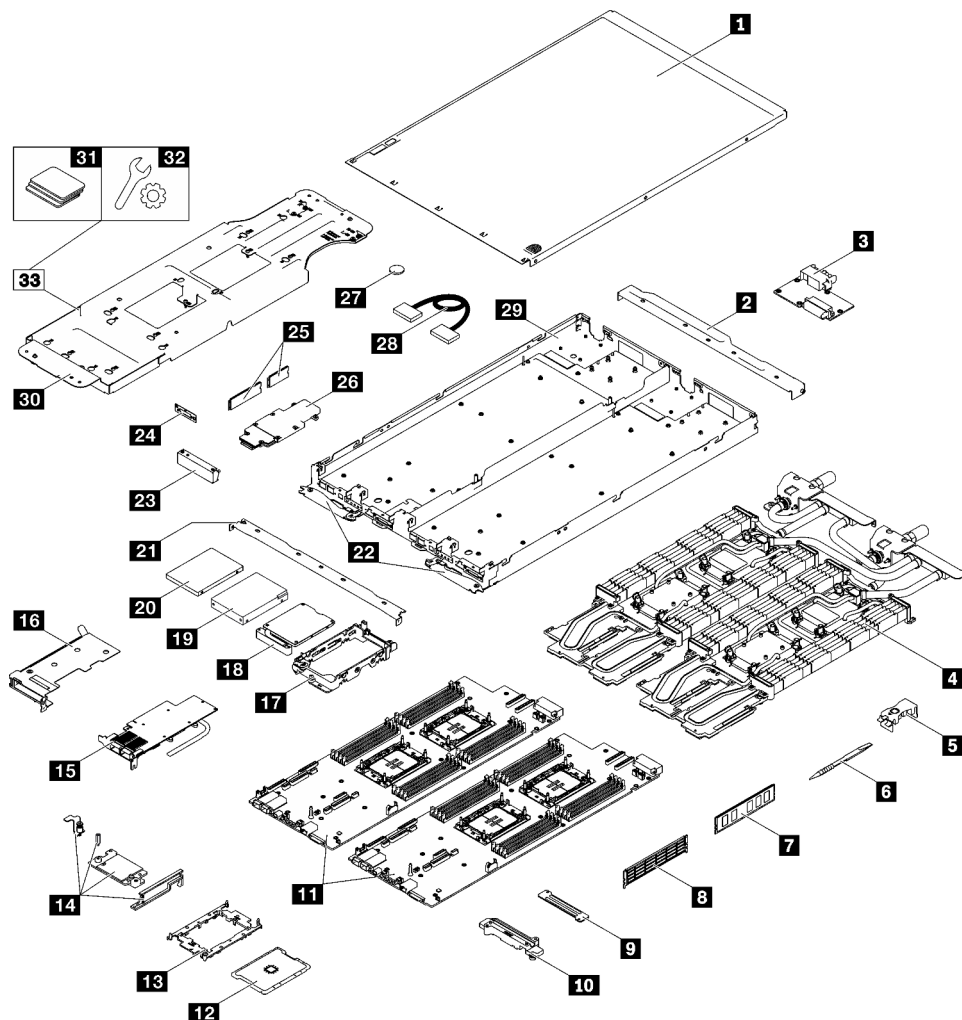


Figure 9. SD650 V3 parts list

Table 10. SD650 V3 parts list

Index	Description	Type
For more information about ordering parts:		
1. Go to http://datacentersupport.lenovo.com and navigate to the support page for your solution.		
2. Click Parts .		
3. Enter the serial number to view a listing of parts for your solution.		
1	Tray cover	F
2	Rear cross brace	F
3	Power distribution board	F
4	Water loop	F
5	DIMM comb	F
6	DIMM tool	F
7	Memory module	F

Table 10. SD650 V3 parts list (continued)

Index	Description	Type
8	Memory module filler	F
9	VR water clamp plate	F
10	VR water loop trough	F
11	System board	F
12	Processor	F
13	Processor retainer	F
14	PCIe adapter kit	F
15	PCIe adapter	F
16	PCIe riser cage	F
17	Drive cage	F
18	Upper Drive Conduction Plate	F
19	2.5-inch drive (15 mm)	F
20	2.5-inch drive (7 mm)	F
21	Front cross brace	T1
22	SD650 V3 cam handles	F
23	Blank bezel filler	F
24	KVM cover	F
25	M.2 drive (80 mm and 110 mm)	F
26	M.2 backplane assembly	F
27	CMOS battery (CR2032)	C
28	Cable	F
29	SD650 V3 tray	F
30	Water loop carrier	F
31	Gap pad kit	F
32	Miscellaneous Parts Kit	F
33	SD650 V3 water loop Service Kit	F

Power cords

Several power cords are available, depending on the country and region where the server is installed.

To view the power cords that are available for the server:

1. Go to:
<http://dcsc.lenovo.com/#/>
2. Click **Preconfigured Model** or **Configure to order**.
3. Enter the machine type and model for your server to display the configurator page.
4. Click **Power** → **Power Cables** to see all line cords.

Notes:

- For your safety, a power cord with a grounded attachment plug is provided to use with this product. To avoid electrical shock, always use the power cord and plug with a properly grounded outlet.
- Power cords for this product that are used in the United States and Canada are listed by Underwriter's Laboratories (UL) and certified by the Canadian Standards Association (CSA).
- For units intended to be operated at 115 volts: Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a parallel blade, grounding-type attachment plug rated 15 amperes, 125 volts.
- For units intended to be operated at 230 volts (U.S. use): Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a tandem blade, grounding-type attachment plug rated 15 amperes, 250 volts.
- For units intended to be operated at 230 volts (outside the U.S.): Use a cord set with a grounding-type attachment plug. The cord set should have the appropriate safety approvals for the country in which the equipment will be installed.
- Power cords for a specific country or region are usually available only in that country or region.

Chapter 4. Unboxing and setup

Information in this section assists you on unboxing and setting up the server. When unboxing the server, check if the items in the package are correct, and learn where to find information of server serial number and Lenovo XClarity Controller access. Make sure to follow the instructions in [“Solution setup checklist” on page 28](#) when setting up the server.

Solution package contents

When you receive your solution, verify that the shipment contains everything that you expected to receive.

The solution package includes the following items:

- DWC tray
- Enclosure
- Rail kit
- Four detachable chassis lift handles
- One console breakout cable (also known as a KVM Dongle)
- Material box, including items such as power cords*, accessory kit, and printed documents.

Notes:

- Some of the items listed are available on select models only.
- Items marked with asterisk(*) are optional.

If any item is missing or damaged, contact your place of purchase. Ensure that you retain your proof of purchase and packing material. They might be required to receive warranty service.

Identify the solution and access the Lenovo XClarity Controller

This section contains instruction on how to identify your solution and where to find the Lenovo XClarity Controller access information.

Identifying your solution

When you contact Lenovo for help, the machine type, model, and serial number information help support technicians to identify your solution and provide faster service.

The illustration below shows the location of the ID label which contains the enclosure model number, machine type, and serial number of the solution. You can also add other system information labels to the front of the enclosure in the customer label spaces.

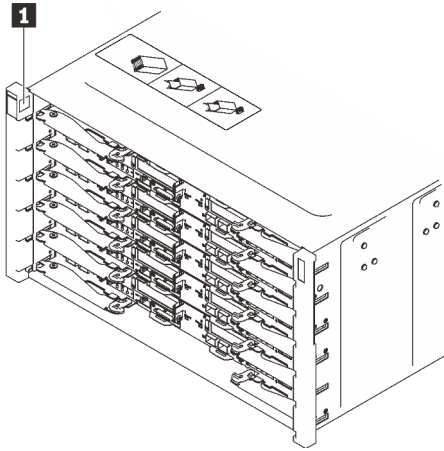


Figure 10. Enclosure label on the front of the enclosure

Table 11. Enclosure label on the front of the enclosure

1 Enclosure label

The tray model number can be found on the front of the tray, as shown in the following illustration.

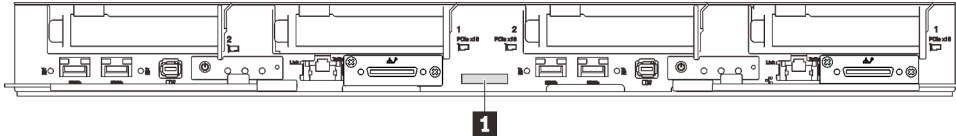


Figure 11. SD650 V3 tray model number

Table 12. Tray model number

1 Tray model number

Lenovo XClarity Controller network access label

In addition, the Lenovo XClarity Controller network access label for both nodes can be found on the pull out information tag located at the front of the tray. You can use the information on the pull out tag to access the XCC MAC address and LLA for each node. The left node information is on the left side and the right node information is on the right side. You can also use the information tag for your own node labeling information such as the hostname, the system name and the inventory bar code.

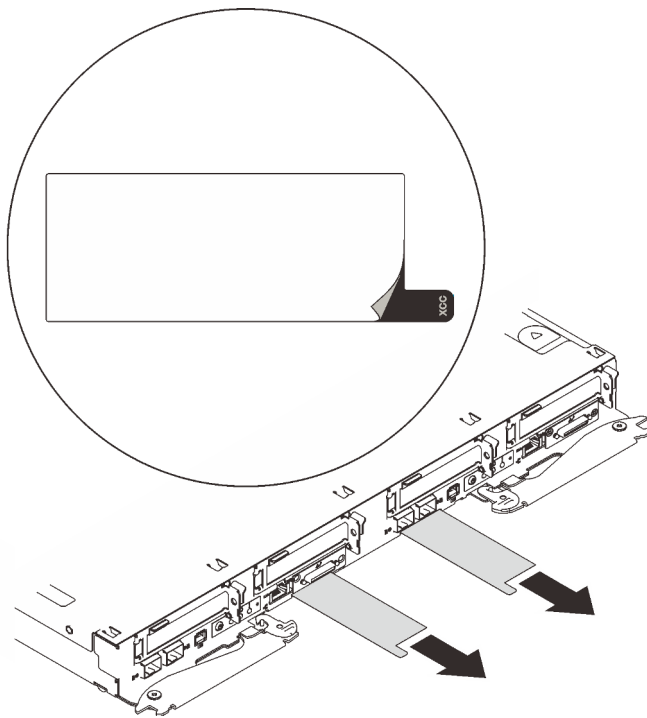


Figure 12. Lenovo XClarity Controller network access label on the pull-out information tab

Service Label and QR code

In addition, the system Service Label is located on the inside surface of the tray cover, provides a quick response (QR) code for mobile access to service information. You can scan the QR code with a mobile device using a QR code reader application and get quick access to the Service Information web page. The Service Information web page provides additional information for parts installation and replacement videos, and error codes for solution support.

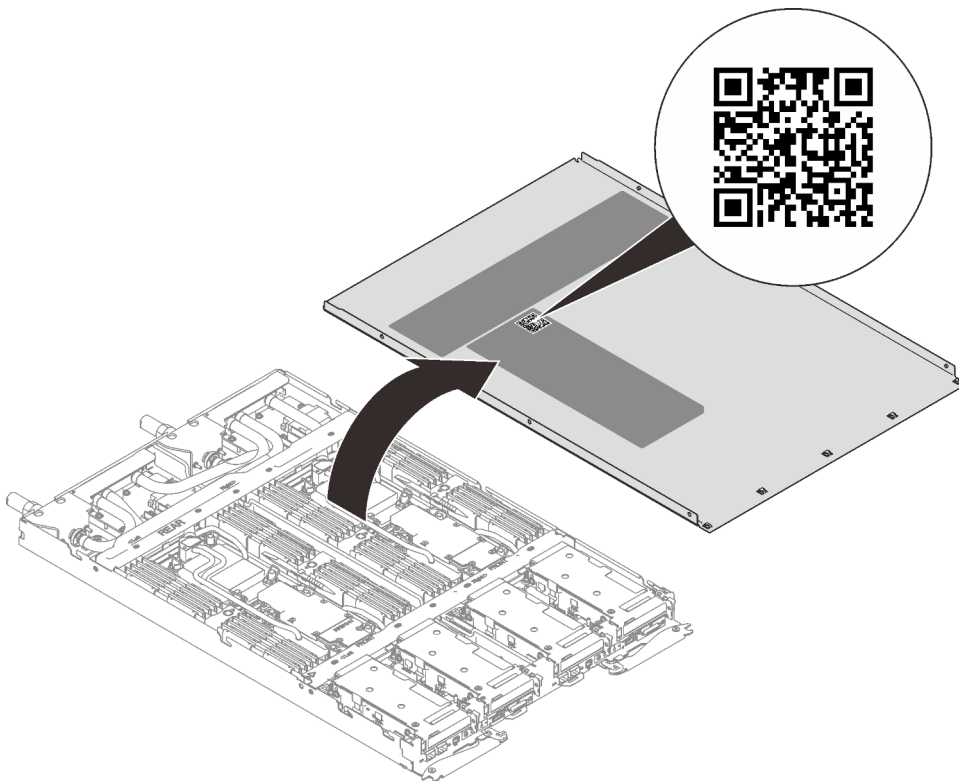


Figure 13. Service Label and QR code

Solution setup checklist

Use the solution setup checklist to ensure that you have performed all tasks that are required to set up your solution.

The solution setup procedure varies depending on the configuration of the solution when it was delivered. In some cases, the solution is fully configured and you just need to connect the solution to the network and an AC power source, and then you can power on the solution. In other cases, the solution needs to have hardware options installed, requires hardware and firmware configuration, and requires an operating system to be installed.

The following steps describe the general procedure for setting up a solution.

Setup the solution hardware

Complete the following procedures to setup the solution hardware.

1. Unpack the solution package. See [“Solution package contents” on page 25](#).
2. Install any required hardware or solution options. See the related topics in [Chapter 5 “Hardware replacement procedures” on page 31](#).
3. Connect all external cables to the solution. See [Chapter 2 “Server components” on page 15](#) for connectors locations.

Typically, you will need to connect the following cables:

- Connect solution to the power source
- Connect solution to the data network
- Connect the solution to the storage device

- Connect the solution to the management network

4. Power on the solution.

Power button location and power LED are specified in [“Troubleshooting by system LEDs and diagnostics display” on page 263](#).

The solution can be turned on (power LED on) in any of the following ways:

- You can press the power button.
- The solution can restart automatically after a power interruption.
- The solution can respond to remote power-on requests sent to the Lenovo XClarity Controller.

Note: You can access the management processor interface to configure the system without powering on the solution. Whenever the solution is connected to power, the management processor interface is available. For details about accessing the management solution processor, see “Opening and Using the XClarity Controller Web Interface” section in the XCC documentation compatible with your solution at <https://pubs.lenovo.com/lxcc-overview/>.

5. Validate the solution. Make sure that the power LED, Ethernet connector LED, and network LED are lit with green light, which means the solution hardware was set up successfully.

See [“Troubleshooting by system LEDs and diagnostics display” on page 263](#) for more information on the LED indications.

Configure the system

Complete the following procedures to configure the system. For detailed instructions, refer to [Chapter 7 “System configuration” on page 237](#).

1. Set the network connection for the Lenovo XClarity Controller to the management network.
2. Update the firmware for the solution, if necessary.
3. Configure the firmware for the solution.

The following information is available for RAID configuration:

- <https://lenovopress.lenovo.com/lp0578-lenovo-raid-introduction>
- <https://lenovopress.lenovo.com/lp0579-lenovo-raid-management-tools-and-resources>

4. Install the operating system.
5. Back up the solution configuration.
6. Install the applications and programs for which the solution is intended to be used.

Chapter 5. Hardware replacement procedures

This section provides installation and removal procedures for all serviceable system components. Each component replacement procedure references any tasks that need to be performed to gain access to the component being replaced.

For more information about ordering parts:

1. Go to <http://datacentersupport.lenovo.com> and navigate to the support page for your solution.
2. Click **Parts**.
3. Enter the serial number to view a listing of parts for your solution.

Note: If you replace a part, such as an adapter, that contains firmware, you might also need to update the firmware for that part. For more information about updating firmware, See “[Update the firmware](#)” on page 239.

Installation Guidelines

Before installing components in your server, read the installation guidelines.

Before installing optional devices, read the following notices carefully:

Attention: Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

- Read the safety information and guidelines to ensure your safety at work:
 - A complete list of safety information for all products is available at:
https://pubs.lenovo.com/safety_documentation/
 - The following guidelines are available as well: “[Handling static-sensitive devices](#)” on page 34.
- Make sure the components you are installing are supported by your server.
 - For a list of supported optional components for the server, see <https://serverproven.lenovo.com>.
 - For the option package contents, see <https://serveroption.lenovo.com/>.
- For more information about ordering parts:
 1. Go to <http://datacentersupport.lenovo.com> and navigate to the support page for your server.
 2. Click **Parts**.
 3. Enter the serial number to view a listing of parts for your server.
- When you install a new server, download and apply the latest firmware. This will help ensure that any known issues are addressed, and that your server is ready to work with optimal performance. Go to <https://datacentersupport.lenovo.com/products/servers/thinksystem/sd650v3/7d7m/downloads/driver-list/> to download firmware updates for your server.

Important: Some cluster solutions require specific code levels or coordinated code updates. If the component is part of a cluster solution, verify that the latest Best Recipe code level menu for cluster supported firmware and driver before you update the code.

- If you replace a part, such as an adapter, that contains firmware, you might also need to update the firmware for that part. For more information about updating firmware, see “[Update the firmware](#)” on page 239.

- It is good practice to make sure that the server is working correctly before you install an optional component.
 - Keep the working area clean, and place removed components on a flat and smooth surface that does not shake or tilt.
 - Do not attempt to lift an object that might be too heavy for you. If you have to lift a heavy object, read the following precautions carefully:
 - Make sure that you can stand steadily without slipping.
 - Distribute the weight of the object equally between your feet.
 - Use a slow lifting force. Never move suddenly or twist when you lift a heavy object.
 - To avoid straining the muscles in your back, lift by standing or by pushing up with your leg muscles.
 - Make sure that you have an adequate number of properly grounded electrical outlets for the server, monitor, and other devices.
 - Back up all important data before you make changes related to the disk drives.
 - Have a small flat-blade screwdriver, a small Phillips screwdriver, and a T8 torx screwdriver available.
 - To view the error LEDs on the system board and internal components, leave the power on.
 - You do not have to turn off the server to remove or install hot-swap power supplies, hot swap fans, or hot-plug USB devices. However, you must turn off the server before you perform any steps that involve removing or installing adapter cables, and you must disconnect the power source from the server before you perform any steps that involve removing or installing a riser card.
 - When replacing power supply units or fans, make sure to refer to redundancy rules for these components.
 - Blue on a component indicates touch points, where you can grip to remove a component from or install it in the server, open or close a latch, and so on.
 - Orange on a component or an orange on or near a component indicates that the component can be hot-swapped if the server and operating system support hot-swap capability, which means that you can remove or install the component while the server is still running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.
 - The Red strip on the drives, adjacent to the release latch, indicates that the drive can be hot-swapped if the server and operating system support hot-swap capability. This means that you can remove or install the drive while the server is still running.
- Note:** See the system specific instructions for removing or installing a hot-swap drive for any additional procedures that you might need to perform before you remove or install the drive.
- After finishing working on the server, make sure you reinstall all safety shields, guards, labels, and ground wires.

Safety inspection checklist

Use the information in this section to identify potentially unsafe conditions with your server. As each machine was designed and built, required safety items were installed to protect users and service technicians from injury.

Note: The product is not suitable for use at visual display workplaces according to §2 of the Workplace Regulations.

Note: The set-up of the server is made in the server room only.

CAUTION:

This equipment must be installed or serviced by trained personnel, as defined by the NEC, IEC 62368-1 & IEC 60950-1, the standard for Safety of Electronic Equipment within the Field of Audio/Video,

Information Technology and Communication Technology. Lenovo assumes you are qualified in the servicing of equipment and trained in recognizing hazards energy levels in products. Access to the equipment is by the use of a tool, lock and key, or other means of security, and is controlled by the authority responsible for the location.

Important: Electrical grounding of the server is required for operator safety and correct system function. Proper grounding of the electrical outlet can be verified by a certified electrician.

Use the following checklist to verify that there are no potentially unsafe conditions:

1. Make sure that the power is off and the power cord is disconnected.
2. Check the power cord.
 - Make sure that the third-wire ground connector is in good condition. Use a meter to measure third-wire ground continuity for 0.1 ohm or less between the external ground pin and the frame ground.
 - Make sure that the power cord is the correct type.

To view the power cords that are available for the server:

 - a. Go to:
<http://dcsc.lenovo.com/#/>
 - b. Click **Preconfigured Model** or **Configure to order**.
 - c. Enter the machine type and model for your server to display the configurator page.
 - d. Click **Power → Power Cables** to see all line cords.
 - Make sure that the insulation is not frayed or worn.
3. Check for any obvious non-Lenovo alterations. Use good judgment as to the safety of any non-Lenovo alterations.
4. Check inside the server for any obvious unsafe conditions, such as metal filings, contamination, water or other liquid, or signs of fire or smoke damage.
5. Check for worn, frayed, or pinched cables.
6. Make sure that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.

System reliability guidelines

Review the system reliability guidelines to ensure proper system cooling and reliability.

Make sure the following requirements are met:

- When the server comes with redundant power, a power supply must be installed in each power-supply bay.
- Adequate space around the server must be spared to allow server cooling system to work properly. Leave approximately 50 mm (2.0 in.) of open space around the front and rear of the server. Do not place any object in front of the fans.
- For proper cooling and airflow, refit the server cover before you turn the power on. Do not operate the server for more than 30 minutes with the server cover removed, for it might damage server components.
- Cabling instructions that come with optional components must be followed.
- A failed fan must be replaced within 48 hours after malfunction.
- A removed hot-swap fan must be replaced within 30 seconds after removal.
- A removed hot-swap drive must be replaced within two minutes after removal.
- A removed hot-swap power supply must be replaced within two minutes after removal.

- Every air baffle that comes with the server must be installed when the server starts (some servers might come with more than one air baffle). Operating the server with a missing air baffle might damage the processor.
- All processor sockets must contain either a socket cover or a processor with heat sink.
- When more than one processor is installed, fan population rules for each server must be strictly followed.

Handling static-sensitive devices

Review these guidelines before you handle static-sensitive devices to reduce the possibility of damage from electrostatic discharge.

Attention: Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

- Limit your movement to prevent building up static electricity around you.
- Take additional care when handling devices during cold weather, for heating would reduce indoor humidity and increase static electricity.
- Always use an electrostatic-discharge wrist strap or other grounding system, particularly when working inside the server with the power on.
- While the device is still in its static-protective package, touch it to an unpainted metal surface on the outside of the server for at least two seconds. This drains static electricity from the package and from your body.
- Remove the device from the package and install it directly into the server without putting it down. If it is necessary to put the device down, put it back into the static-protective package. Never place the device on the server or on any metal surface.
- When handling a device, carefully hold it by the edges or the frame.
- Do not touch solder joints, pins, or exposed circuitry.
- Keep the device from others' reach to prevent possible damages.

Memory module installation rules and order

Memory modules must be installed in a specific order based on the memory configuration that you implement on your node.

For information on the types of memory module supported by this server, see “Memory” section in [“Technical specifications” on page 4](#).

The following memory configurations are available:

- Memory configurations for standard processor
 - Independent memory mode
 - Memory mirroring
- Memory configurations for Intel® Xeon® CPU Max processor
 1. HBM-only mode
 2. Flat mode
 3. Cache mode

Information about optimizing memory performance and configuring memory is available at the Lenovo Press website:

<https://lenovopress.lenovo.com/servers/options/memory>

In addition, you can take advantage of a memory configurator, which is available at the following site:

https://dcsc.lenovo.com/#/memory_configuration

Specific information about the required installation order of memory modules in your solution based on the system configuration and memory mode that you are implementing is shown below.

Memory modules and processors layout

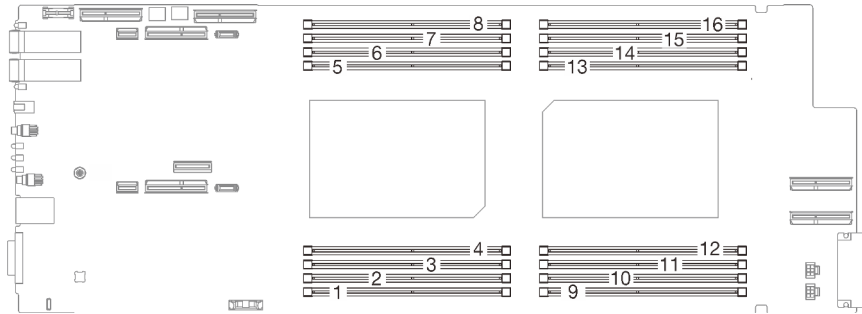


Figure 14. Memory modules and processors layout

The memory-channel configuration table below shows the relationship between the processors, memory channels, and memory module slot numbers.

Table 13. Channel and slot information of DIMMs around a processor

CPU	CPU 1								CPU 2							
iMC	iMC1		iMC0		iMC2		iMC3		iMC3		iMC2		iMC0		iMC1	
Memory channel	1	0	1	0	0	1	0	1	1	0	1	0	0	1	0	1
DIMM slot number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

DRAM DIMMs installation order

This section contains information of how to install DRAM DIMMs properly.

Independent memory mode installation order

In independent memory mode, memory channels can be populated with DIMMs in any order and you can populate all channels for each processor in any order with no matching requirements. Independent memory mode provides the highest level of memory performance, but lacks failover protection. The DIMM installation order for independent memory mode varies based on the number of processors and memory modules installed in the server.

Independent memory mode guidelines:

- Individual memory channels can run at different DIMM timings, but all channels must run at the same interface frequency.
- Populate memory channel 0 first.
- In each memory channel, populate slot 0 first.
- Memory channel 1 is empty or identically populated as memory channel 0.
- Memory channel 2 is empty or identically populated as memory channel 1.
- If a memory channel has two DIMMs, populate the DIMM with a higher number of ranks in slot 0.
- Mixing DIMMs with different capacity is not allowed. All DIMMs installed must be identical.

Independent mode population sequence

SD650 V3 supports fully populated processors only (two processors per node).

Table 14. Independent mode memory population sequence

	Processor 1								Processor 2							
iMC	iMC1		iMC0		iMC2		iMC3		iMC3		iMC2		iMC0		iMC1	
Memory channel	1	0	1	0	0	1	0	1	1	0	1	0	0	1	0	1
DIMM slot number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
16 DIMMS	DI-MM	DIM-M	DIM-M	DIM-M	DIM-M	DIM-M	DIM-M	DIM-M	DIM-M	DIM-M	DIM-M	DIM-M	DIM-M	DIM-M	DIM-M	DIM-M

Notes:

- Sub NUMA Clustering 2 (SNC2) is supported and can be enabled in UEFI.
- Software Guard Extensions (SGX) is supported. See [“Enable Software Guard Extensions \(SGX\)” on page 244](#) to enable this feature.

Mirroring mode installation order

Memory-mirroring mode provides full memory redundancy while reducing the total system memory capacity in half. Memory channels are grouped in pairs with each channel receiving the same data. If a failure occurs, the memory controller switches from the DIMMs on the primary channel to the DIMMs on the backup channel. The DIMM installation order for memory mirroring varies based on the number of processors and DIMMs installed in the server.

Memory mirroring guidelines:

- Memory mirroring reduces the maximum available memory by half of the installed memory. For example, if the server has 64 GB of installed memory, only 32 GB of addressable memory is available when memory mirroring is enabled.
- Each DIMM must be identical in size and architecture.
- DIMMs on each memory channel must be of equal density.
- If two memory channels have DIMMs, mirroring occurs across two DIMMs (channels 0/1 will both contain the primary/secondary memory caches).
- If three memory channels have DIMMs, mirroring occurs across all three DIMMs (channels 0/1, channels 1/2, and channels 2/0 will all contain primary/secondary memory caches).
- Mixing DIMMs with different capacity is not allowed. All DIMMs installed must be identical.
- Partial Memory Mirroring is a sub-function of memory mirroring. It requires following the memory installation order of memory mirroring mode.

Mirroring mode population sequence

SD650 V3 supports fully populated processors only (two processors per node)

Table 15. Mirroring mode memory population sequence

	Processor 1								Processor 2							
iMC	iMC1		iMC0		iMC2		iMC3		iMC3		iMC2		iMC0		iMC1	
Memory channel	1	0	1	0	0	1	0	1	1	0	1	0	0	1	0	1
DIMM slot number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
16 DIMMS	DI-MM	DIM-M	DIM-M	DIM-M	DIM-M	DIM-M	DIM-M	DIM-M	DIM-M	DIM-M	DIM-M	DIM-M	DIM-M	DIM-M	DIM-M	DIM-M

Notes:

- Sub NUMA Clustering 2 (SNC2) is supported and can be enabled in UEFI.
- Software Guard Extensions (SGX) is supported. See [“Enable Software Guard Extensions \(SGX\)” on page 244](#) to enable this feature.

DRAM DIMMs installation order for Intel® Xeon® CPU Max processor

This section contains information of how to install DRAM DIMMs properly when the system is installed with Intel® Xeon® CPU Max processors.

Intel® Xeon® CPU Max operating systems support

Intel® Xeon® CPU Max requires specific version of supported operating systems. Make sure the operating system in the server is updated to designated version for proper Intel® Xeon® CPU Max implementation. For OS deployment instructions, see [“Deploy the operating system” on page 246](#).

See the table below for operation system version requirements:

Table 16. Intel® Xeon® CPU Max operating system supported for SD650 V3

Operating system	version
RHEL	8.6 and 9.0 RHEL Version 8 specifically does not include the driver automatically using Flat mode. It is still possible to use Flat mode, it just needs to be explicitly enabled by user in the kernel parameters.
SLES	15 SP4

Memory modes for Intel® Xeon® CPU Max processors and High Bandwidth Memory (HBM)

An Intel® Xeon® CPU Max processor contains 64 GB High Bandwidth Memory (HBM). When the system is installed with Intel® Xeon® CPU Max processor, the HBM and DRAM DIMMs memory capacity can be configured to three modes. The system views HBM differently in each mode and requires specific memory population sequence. The three modes and their corresponding memory population rules are as follow:

- **HBM-only mode**

In HBM-only mode, there is no DRAM DIMM installed in the system, and the only memory available is HBM.

- For DRAM DIMM installation order, see [“HBM-only mode memory population sequence” on page 38](#).

- **Flat mode**

In Flat mode, DRAM DIMMs and HBM are both installed in the system. The system view both of them as memory.

- For DRAM DIMM installation order, see [“Flat mode memory population sequence” on page 40](#).

- **Cache mode**

In Cache mode, DRAM DIMMs and HBM are both installed in the system. The system view DRAM DIMMs as memory and HBM as cache for DRAM DIMMs.

- DRAM memory to HBM ratio must be in 2:1 and up to 64:1 ratio for each processor. Each Intel® Xeon® CPU Max processor contains 64 GB High Bandwidth Memory.
- For DRAM DIMM installation order, see [“DRAM DIMMs installation order” on page 36](#).

Notes:

- SD650 V3 supports fully populated processors only (two processors per node).
- Mixing DIMMs with different capacity is not allowed. All DIMMs installed must be identical.
- Memory modes can be set up in UEFI

HBM-only mode memory population sequence

Table 17. HBM-only mode memory population sequence

F stands for DIMM filler.

Table 17. HBM-only mode memory population sequence (continued)

	Processor 1								Processor 2							
iMC	iMC1		iMC0		iMC2		iMC3		iMC3		iMC2		iMC0		iMC1	
Memory channel	1	0	1	0	0	1	0	1	1	0	1	0	0	1	0	1
DIMM slot number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
0 DIMMs	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F

Flat mode memory population sequence

Table 18. Flat mode memory population sequence

F stands for DIMM filler and **D** stands for DRAM DIMM.

	Processor 1								Processor 2							
iMC	iMC1		iMC0		iMC2		iMC3		iMC3		iMC2		iMC0		iMC1	
Memory channel	1	0	1	0	0	1	0	1	1	0	1	0	0	1	0	1
DIMM slot number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
2 DIMMs	F	F	F	D	F	F	F	F	F	F	F	F	D	F	F	F
4 DIMMs	F	F	F	D	F	F	D	F	F	D	F	F	D	F	F	F
8 DIMMs	F	D	F	D	D	F	D	F	F	D	F	D	D	F	D	F
16 DIMMs	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D

Cache mode memory population sequence

Table 19. Cache mode memory population sequence

F stands for DIMM filler and **D** stands for DRAM DIMM.

	Processor 1								Processor 2							
iMC	iMC1		iMC0		iMC2		iMC3		iMC3		iMC2		iMC0		iMC1	
Memory channel	1	0	1	0	0	1	0	1	1	0	1	0	0	1	0	1
DIMM slot number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
8 DIMMs Supports 32 GB, 64 GB, and 128 GB DIMM.	F	D	F	D	D	F	D	F	F	D	F	D	D	F	D	F
16 DIMMs Supports 16 GB, 32 GB, 64 GB, and 128 GB DIMM.	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D

Gap pad/Putty pad identification and location

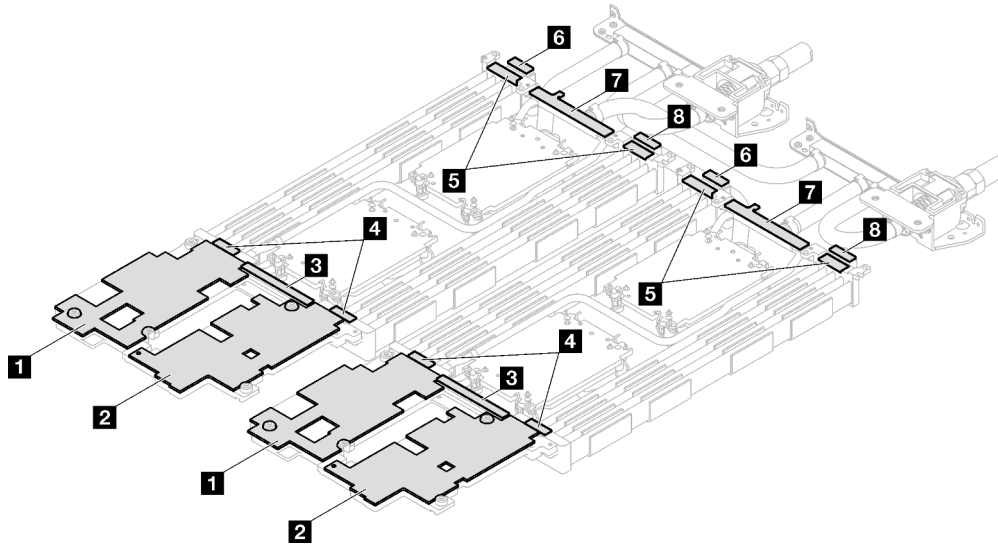
Follow the information in this section to identify their shape, location, and orientation of the various gap pads and putty pads used in SD650 V3.

Installation Guidelines for gap pad and putty pad

There are two types of thermal pads: putty pad and gap pad. When replacing components, always replace putty pad. Replace gap pad if it is damaged or detached.

Attention: Do not use expired putty pad. Check the expiry date on putty pad package. If the putty pads are expired, acquire new ones to properly replace them.

Gap pad/Putty pad identification and location



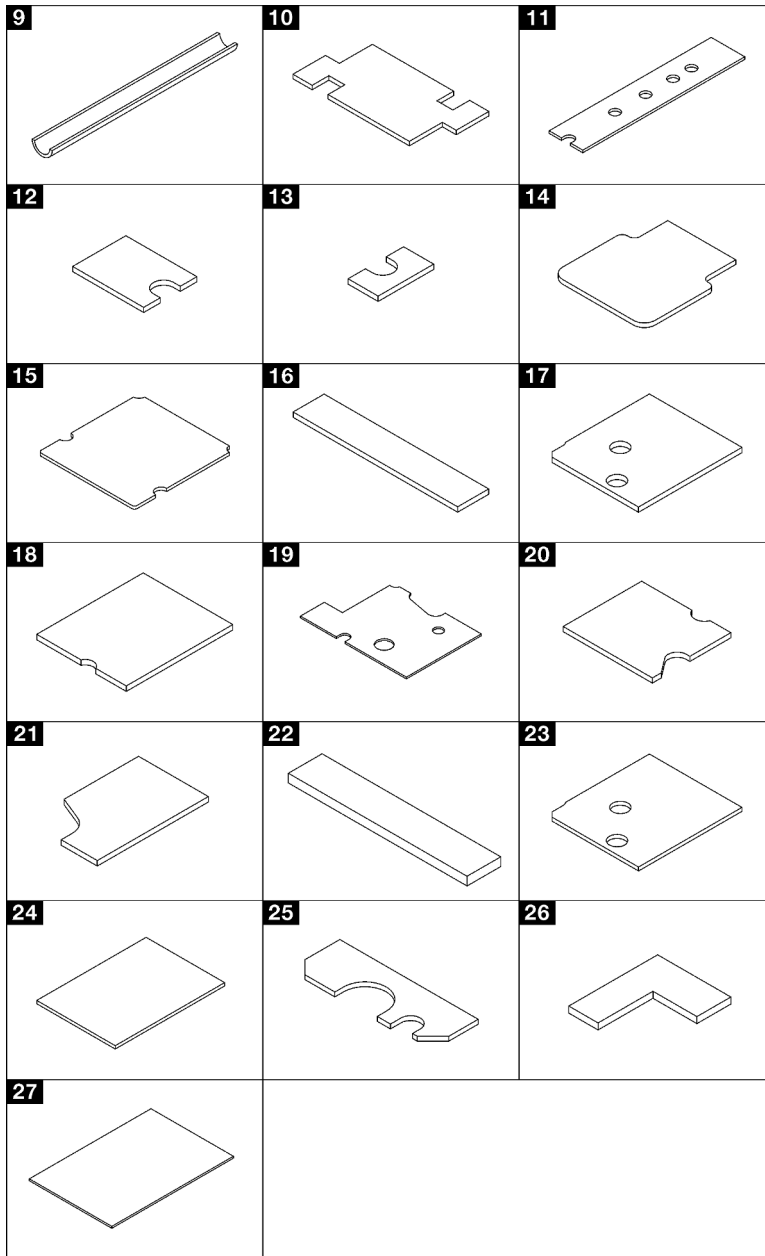


Figure 15. Gap pads and putty pads used in SD650 V3

Table 20. Gap pads and putty pads used in SD650 V3

Pad index	Pad category	Attached component	Pad orientation
1	Gap pad	Water loop	Gray side facing outward
2	Gap pad	Water loop	Gray side facing outward
3	Gap pad	Water loop	Gray side facing outward
4	Gap pad	Water loop	Gray side facing outward
5	Gap pad	Water loop	Gray side facing outward
6	Gap pad	Water loop	Gray side facing outward
7	Gap pad	Water loop	Gray side facing outward
8	Gap pad	Water loop	Gray side facing outward
9	Gap pad	VR water loop trough (installed on system board)	Gray side facing outward
10	Gap pad	VR water loop trough (installed on system board)	Gray side facing outward
11	Putty pad	M.2 backplane assembly	Align pad cutout to the screw hole and opening on the interface plate as shown in “Install an M.2 drive” on page 139.
12	Putty pad	M.2 backplane assembly	Align pad cutout to the screw hole and opening on the interface plate as shown in “Install the M.2 backplane assembly” on page 134.
13	Putty pad	M.2 backplane assembly	
14	Putty pad	M.2 backplane assembly	
15	Putty pad	M.2 backplane assembly	
16	Gap pad	Drive cage	Gray side facing outward
17	Gap pad	Drive cage	Gray side facing outward
18	Putty pad	PCIe riser (ConnectX-6)	Align pad cutout to the screw hole and opening on the interface plate as shown in “Install a PCIe riser assembly (ConnectX-6)” on page 160.
19	Putty pad	PCIe riser (ConnectX-7 NDR 400)	Align pad cutout to the screw hole and opening on the interface plate as shown in “Install a PCIe riser assembly (ConnectX-7 NDR 400)” on page 181.
20	Putty pad	PCIe riser (ConnectX-7 NDR 200)	Align pad cutout to the screw hole and opening on the interface plate as shown in “Install a PCIe riser assembly (ConnectX-7 NDR 200)” on page 171.
21	Putty pad	PCIe riser (ConnectX-7 NDR 200)	
22	Putty pad	U.3 7mm drive conduction plate	Both sides can be facing outward

Table 20. Gap pads and putty pads used in SD650 V3 (continued)

Pad index	Pad category	Attached component	Pad orientation
23	Gap pad	U.3 7mm drive cage	Align pad cutout to the screw hole and opening on the interface plate as shown in “Install a drive cage assembly” on page 95
24	Gap pad	E3.S drive	Both sides can be facing outward
25	Putty pad		Align pad cutout to the screw hole and opening on the interface plate as shown in “Install an E3.s drive” on page 119 .
26	Putty pad		
27	Gap pad	E3.S drive cage	Both sides can be facing outward

Power on and power off the solution

Follow the instructions in this section to power on and power off the solution.

Power on the solution

After the solution performs a short self-test (power status LED flashes quickly) when connected to input power, it enters a standby state (power status LED flashes once per second).

Power button location and power LED are specified in [“Troubleshooting by system LEDs and diagnostics display” on page 263](#).

The solution can be turned on (power LED on) in any of the following ways:

- You can press the power button.
- The solution can restart automatically after a power interruption.
- The solution can respond to remote power-on requests sent to the Lenovo XClarity Controller.

For information about powering off the solution, see [“Power off the solution” on page 44](#).

Power off the solution

The solution remains in a standby state when it is connected to a power source, allowing the Lenovo XClarity Controller to respond to remote power-on requests. To remove all power from the solution (power status LED off), you must disconnect all power cables.

Power button location and power LED are specified in [“Troubleshooting by system LEDs and diagnostics display” on page 263](#).

To place the solution in a standby state (power status LED flashes once per second):

Note: The Lenovo XClarity Controller can place the solution in a standby state as an automatic response to a critical system failure.

- Start an orderly shutdown using the operating system (if supported by your operating system).
- Press the power button to start an orderly shutdown (if supported by your operating system).
- Press and hold the power button for more than 4 seconds to force a shutdown.

When in a standby state, the solution can respond to remote power-on requests sent to the Lenovo XClarity Controller. For information about powering on the solution, see [“Power on the solution” on page 44](#).

Replace components in the tray

Use the following information to remove and install tray components.

DWC tray replacement

Use the following procedures to remove and install a DWC tray.

Remove a DWC tray from the enclosure

Use this information to remove a DWC tray from the enclosure.

About this task

Important: For your safety, use the lift tool to remove the tray from the rack.

Attention:

- Read [“Installation Guidelines” on page 31](#) and [“Safety inspection checklist” on page 32](#) to ensure that you work safely.
- Turn off the corresponding DWC tray that you are going to perform the task on.
- Disconnect all external cables from the enclosure.
- Use extra force to disconnect QSFP cables if they are connected to the solution.

Attention: Shared I/O configuration requires specific power on and power off sequence for the two nodes, see below:

- Power on sequence: first, power on the node with **main** adapter (right node); then, power on the node with **auxiliary** adapter (left node).
- Power off sequence: first, power off the node with **auxiliary** adapter (left node); then, power off the node with **main** adapter (right node).

Note: The following illustration might differ slightly from your hardware, but the removal method is the same.

Procedure

Step 1. Remove the tray.

- a. ① Rotate the front cam handles as shown in the illustration. The tray moves out of the tray bay approximately 0.6 cm (0.25 inch).
- b. ② Pull the DWC tray out of the enclosure until you see the warning icon in the right side of the cover; then, adjust hands and grip tray (~49 lb.) at sides to carefully pull out of enclosure.

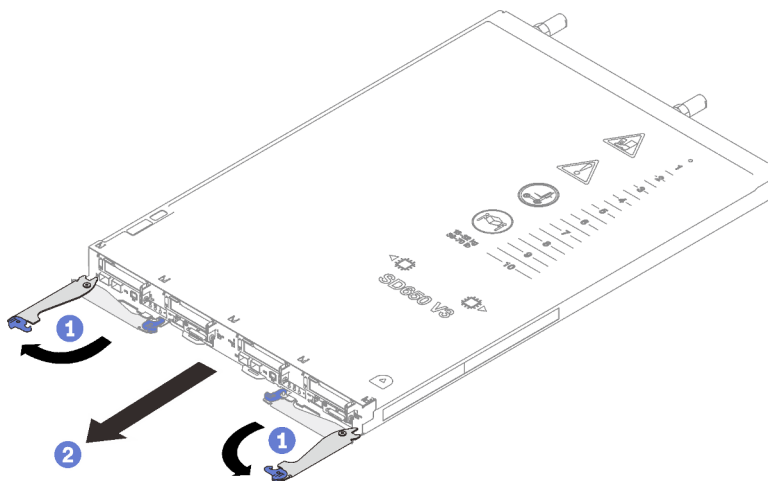


Figure 16. Tray removal

Attention:

- To maintain proper system cooling, do not operate the enclosure without a DWC tray or tray bay filler installed in each tray bay. For more information, see [“Install a DWC tray in the enclosure” on page 46](#).
- When you remove the DWC tray, note the tray bay number. Reinstalling a DWC tray into a different tray bay from the one it was removed from can have unintended consequences. Some configuration information and update options are established according to tray bay number. If you reinstall the DWC tray into a different tray bay, you might have to reconfigure the DWC tray.

Step 2. Once the DWC tray has been serviced, place the tray back into the original position as soon as possible.

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

[Watch the procedure on YouTube](#)

Install a DWC tray in the enclosure

Use this information to install a DWC tray in the enclosure.

About this task

Attention:

- Read [“Installation Guidelines” on page 31](#) and [“Safety inspection checklist” on page 32](#) to ensure that you work safely.
- When installing different DWC trays in the DW612S enclosure, make sure to follow the rules in [Guidance on mixing trays configuration for the DW612S enclosure](#).

Note: For your safety, use the lift tool to install the tray into the rack.

Procedure

Note: The following illustration might differ slightly from your hardware, but the installation method is the same.

Step 1. Select the tray bay to install the tray.

Attention:

- To maintain proper system cooling, do not operate the enclosure without a DWC tray or tray bay filler installed in each tray bay. See the picture below for reference.
- Start with slot 1 when installing trays into the DW612S enclosure.
- If you are reinstalling a DWC tray that you removed, you must install it in the same tray bay from which you removed it. Some DWC tray configuration information and update options are established according to tray bay number. Reinstalling a DWC tray into a different tray bay can have unintended consequences. If you reinstall the DWC tray into a different tray bay, you might have to reconfigure the DWC nodes in the tray.

Step 2. Install the tray.

- a. ① Make sure that the front cam handles on the DWC tray are in the open position; then, insert the DWC tray into the tray bay until it stops.
- b. ② Rotate the front cam handles on the front of the DWC tray to the closed position to secure the tray in the enclosure.

Note: Depending on the model, your solution might look slightly different from the illustration.

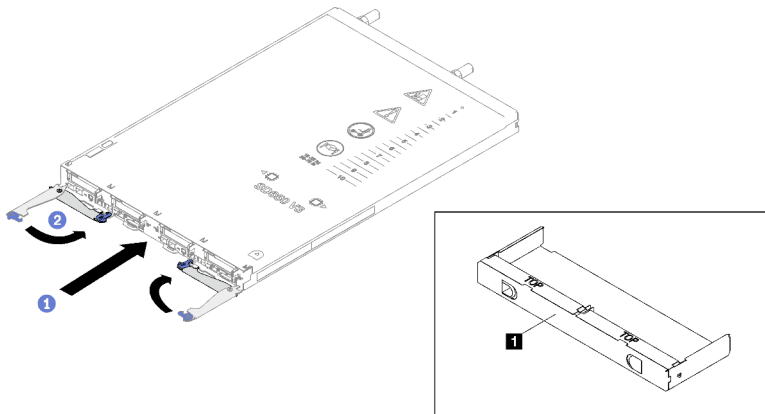


Figure 17. Tray installation

1 Tray bay filler

Note: After the DWC tray is installed, the XCC in the DWC tray initializes. This process takes approximately 110 seconds. The power LED flashes rapidly, and the power button on the DWC tray does not respond until this process is complete.

Step 3. Connect all required external cables to the enclosure.

Note: Use extra force to connect QSFP cables to the solution.

Step 4. Press the power buttons to turn on both nodes in the DWC tray.

Attention: Shared I/O configuration requires specific power on and power off sequence for the two nodes, see below:

- Power on sequence: first, power on the node with **main** adapter (right node); then, power on the node with **auxiliary** adapter (left node).

- Power off sequence: first, power off the node with **auxiliary** adapter (left node); then, power off the node with **main** adapter (right node).

Step 5. Make sure that the power LED on the front operator panel is lit continuously, indicating that the each node is receiving power and is turned on.

Step 6. If you have other trays to install, do so now.

After you finish

- If this is the initial installation of the DWC tray in the enclosure, you must configure the DWC tray through the Setup Utility and install the DWC tray operating system.
- If you have changed the configuration of the DWC tray or if you are installing a different DWC tray from the one that you removed, you must configure the DWC tray through the Setup Utility, and you might have to install the DWC tray operating system.

Demo video

[Watch the procedure on YouTube](#)

Tray cover replacement

Use the following procedures to remove and install the tray cover.

Remove the tray cover

Use this information to remove the tray cover.

About this task

Attention:

- Read [“Installation Guidelines” on page 31](#) and [“Safety inspection checklist” on page 32](#) to ensure that you work safely.
- Turn off the corresponding DWC tray that you are going to perform the task on.
- Disconnect all external cables from the enclosure.
- Use extra force to disconnect QSFP cables if they are connected to the solution.

Procedure

Step 1. Remove the tray from the enclosure. See [“Remove a DWC tray from the enclosure” on page 45](#).

Step 2. Press on the release latch and the push point at the same time and slide the cover toward the rear of the DWC tray.

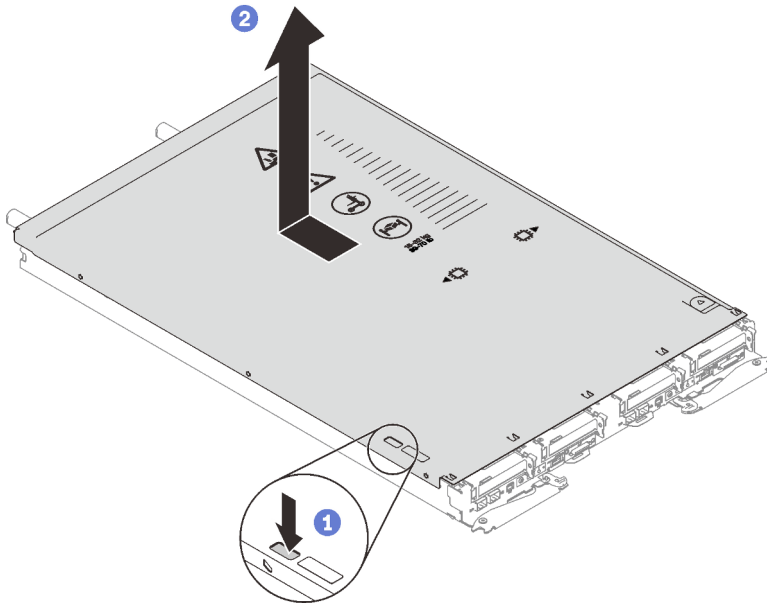


Figure 18. Tray cover removal

Step 3. Lift the cover off the DWC tray and set it aside.

Note: Service label instructions are located on the underside of each tray cover.

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

[Watch the procedure on YouTube](#)

Install the tray cover

Use this information to install the tray cover.

About this task

Attention:

- Read [“Installation Guidelines” on page 31](#) and [“Safety inspection checklist” on page 32](#) to ensure that you work safely.

Note: The following illustration might differ slightly from your hardware, but the installation method is the same.

Procedure

Step 1. Position the cover on top of the tray and slide the cover towards the front of the tray.

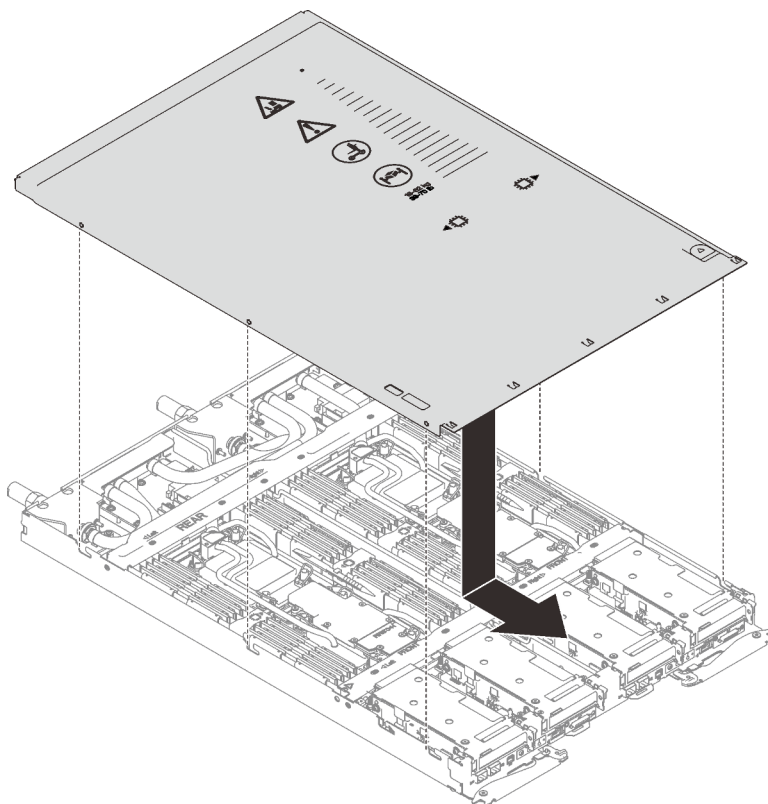


Figure 19. Tray cover installation

Important: Before you slide the cover forward, make sure that all the tabs on the front, rear, and side of the cover are engaged with the enclosure correctly. If all the tabs do not engage the enclosure correctly, it will be very difficult to remove the cover later.

After you finish

1. Install the tray into the enclosure. See [“Install a DWC tray in the enclosure” on page 46](#).
2. Connect all required external cables to the solution.

Note: Use extra force to connect QSFP cables to the solution.

3. Check the power LED on each node to make sure it changes from fast blink to slow blink to indicate all nodes are ready to be powered on.

Demo video

[Watch the procedure on YouTube](#)

Cross braces replacement

Use the following procedures to remove and install the cross braces in SD650 V3 tray.

Remove the cross braces

Use this information to remove the cross braces.

About this task

Attention:

- Read [“Installation Guidelines” on page 31](#) and [“Safety inspection checklist” on page 32](#) to ensure that you work safely.
- Turn off the corresponding DWC tray that you are going to perform the task on.
- Disconnect all external cables from the enclosure.
- Use extra force to disconnect QSFP cables if they are connected to the solution.

Procedure

Step 1. Make preparations for this task.

- a. Remove the tray from the enclosure. See [“Remove a DWC tray from the enclosure” on page 45](#).
- b. Remove the tray cover. See [“Remove the tray cover” on page 48](#).

Step 2. Remove the front and the rear cross braces (14x Phillips #1 screws).

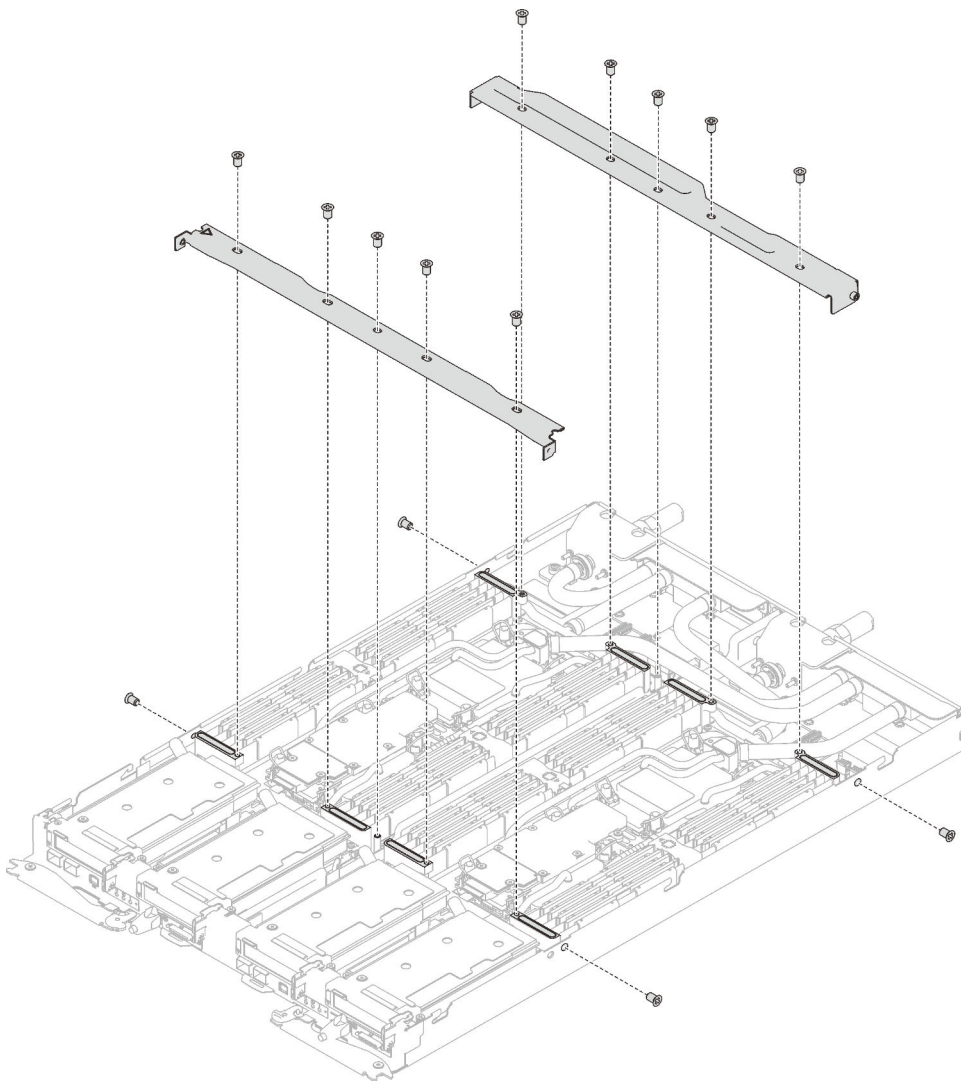


Figure 20. Cross brace removal (SD650 V3)

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

[Watch the procedure on YouTube](#)

Install the cross braces

Use this information to install the cross braces.

About this task

Attention:

- Read [“Installation Guidelines” on page 31](#) and [“Safety inspection checklist” on page 32](#) to ensure that you work safely.

Procedure

Step 1. Install the front and the rear cross braces (14x Phillips #1 screws).

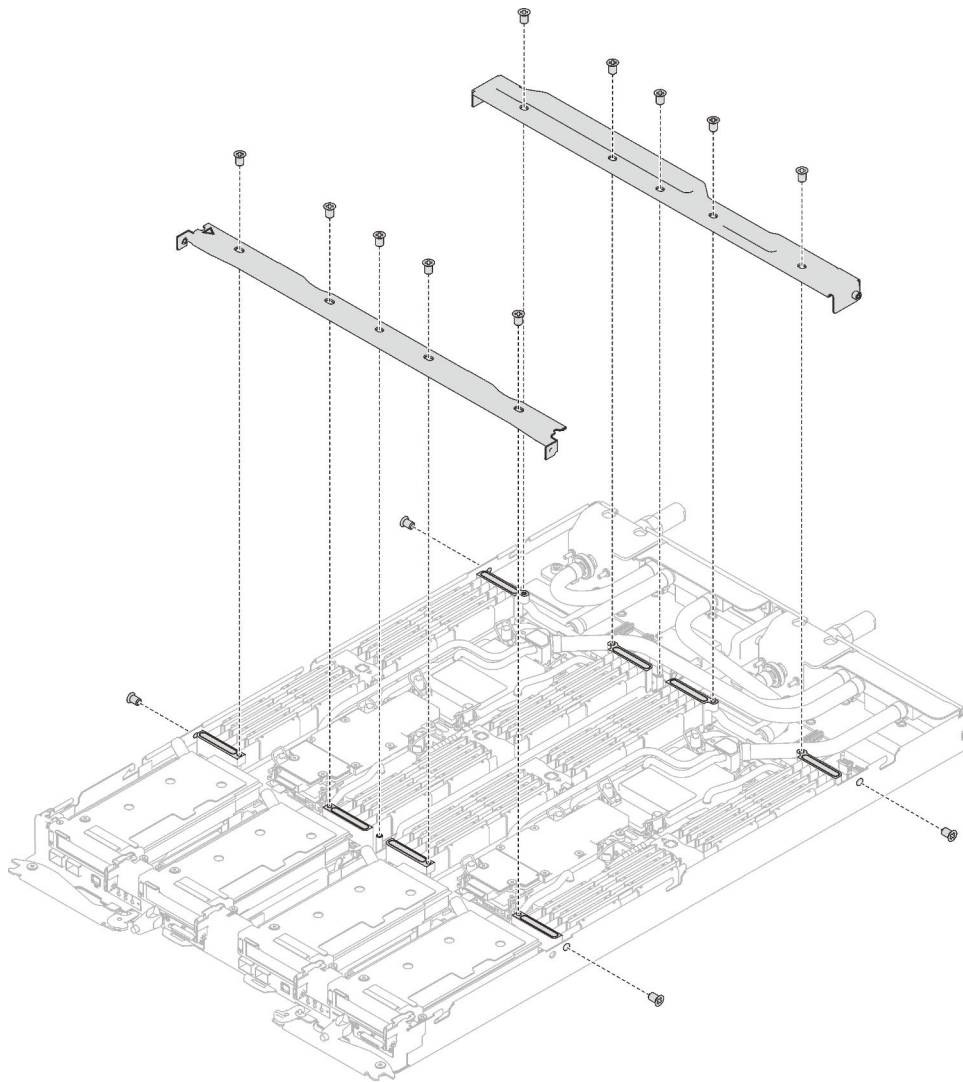


Figure 21. Cross brace installation (SD650 V3)

After you finish

1. Install the tray cover. See [“Install the tray cover” on page 49](#).
2. Install the tray into the enclosure. See [“Install a DWC tray in the enclosure” on page 46](#).
3. Connect all required external cables to the solution.

Note: Use extra force to connect QSFP cables to the solution.

4. Check the power LED on each node to make sure it changes from fast blink to slow blink to indicate all nodes are ready to be powered on.

Demo video

[Watch the procedure on YouTube](#)

Water loop replacement (trained technician only)

Use the following procedures to remove and install the water loop in the SD650 V3 tray.

Attention:

- The water loop replacement procedure requires trained personnel.
- For your safety, use lift tool to remove the tray from the enclosure.

Remove the water loop

Use this information to remove the water loop in the SD650 V3 tray.

About this task**Required tools**

Make sure you have the required tools listed below in hand to properly replace the component.

- Water loop kits
 - SD650 V3 Water loop service kit
 - Conduction plate parts (only damaged parts need to be replaced)
 - M.2 Putty pad kit
- Drive gap pad or putty pad kits according to the drives installed in the tray. See their respective replacement procedures for more information.
- ConnectX series adapter putty pad kits according to the ConnectX adapter installed in the tray. See their respective replacement procedures for more information.
- Screws and screwdrivers

Prepare the following screwdrivers to ensure you can install and remove corresponding screws properly.

Screwdriver Type	Screw Type
Torx T10 head screwdriver	Torx T10 screw
Torx T30 head screwdriver	Torx T30 screw
Phillips #1 head screwdriver	Phillips #1 screw
Phillips #2 head screwdriver	Phillips #2 screw

Attention:

- Read [“Installation Guidelines” on page 31](#) and [“Safety inspection checklist” on page 32](#) to ensure that you work safely.
- Turn off the corresponding DWC tray that you are going to perform the task on.
- Disconnect all external cables from the enclosure.
- Use extra force to disconnect QSFP cables if they are connected to the solution.
- To avoid damaging the water loop, always use the water loop carrier when removing, installing or folding the water loop.

Procedure

Step 1. Make preparations for this task.

- a. Remove the tray from the enclosure. See [“Remove a DWC tray from the enclosure” on page 45](#).
- b. Remove the tray cover. See [“Remove the tray cover” on page 48](#).
- c. Remove the cross braces. See [“Remove the cross braces” on page 50](#).
- d. Remove the DIMM comb. See [“Remove a DIMM comb” on page 81](#).

- e. Remove memory modules. See [“Remove a memory module” on page 141](#).
- f. Remove the M.2 backplane assembly. See [“Remove the M.2 backplane assembly” on page 130](#).

Note: The M.2 backplane cold plate needs to be removed as well.

- g. Remove the drive cage. See [“Remove a drive cage assembly” on page 85](#).
- h. Remove the PCIe riser assembly. Depending on your configuration, see [“Remove a PCIe riser assembly \(ConnectX-6\)” on page 156](#), [“PCIe riser assembly replacement \(ConnectX-7 NDR 200\)” on page 165](#), or [“Remove a PCIe riser assembly \(ConnectX-7 NDR 400\)” on page 175](#).

Step 2. Remove two Torx T10 screws (per node); then, remove the VR (voltage regulator) clamp plate out of the node.

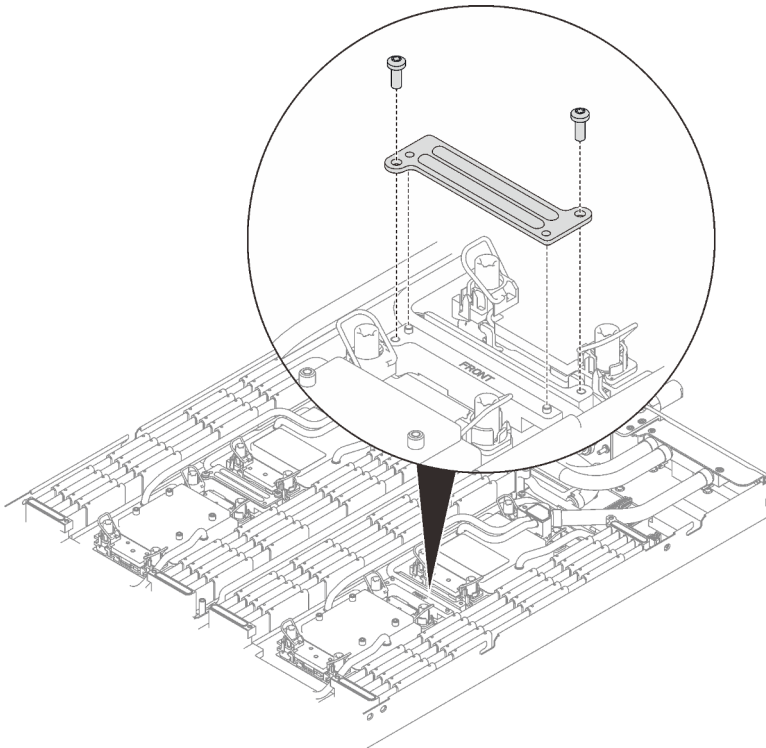


Figure 22. VR clamp plate removal

Step 3. Remove the following screws to loosen the quick connect.

- Four Torx T10 screws to loosen the quick connect.
- Ten Torx T10 screws on the rear of the node.

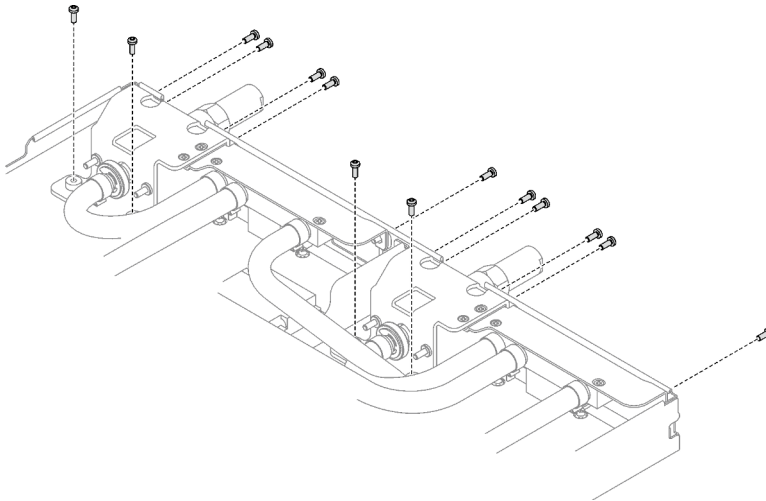


Figure 23. Quick connect screw removal

- Step 4. Remove water loop screws (18x Torx T10 screws for two nodes) with a torque screwdriver set to the proper torque.

Note: For reference, the torque required for the screws to be fully tightened/removed is 5.0+/- 0.5 lbf-in, 0.55+/- 0.05 N-M.

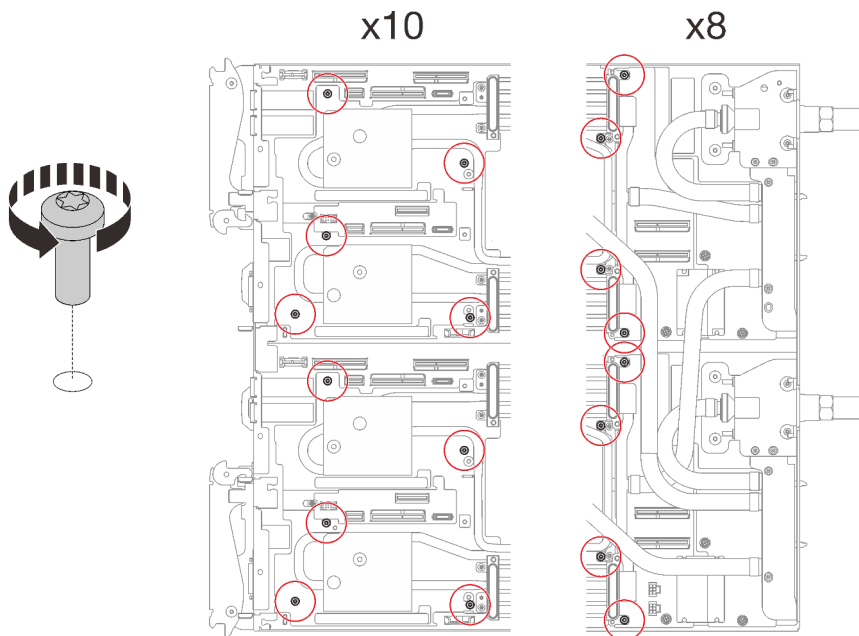


Figure 24. Water loop screw removal

- Step 5. Orient two water loop carriers with the guide pins; then, gently put the two water loop carriers down and ensure they are seated firmly on the water loop.

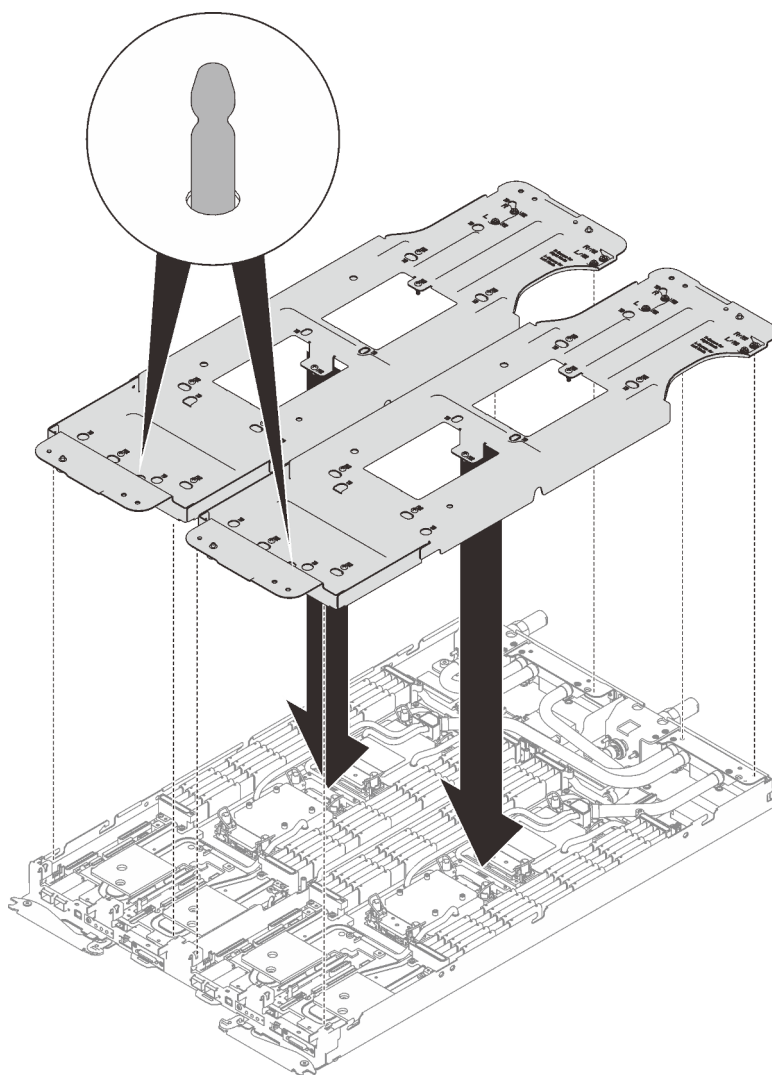


Figure 25. Water loop carrier installation

Step 6. Tighten water loop carrier screws (24x Phillips #2 screws for two nodes).

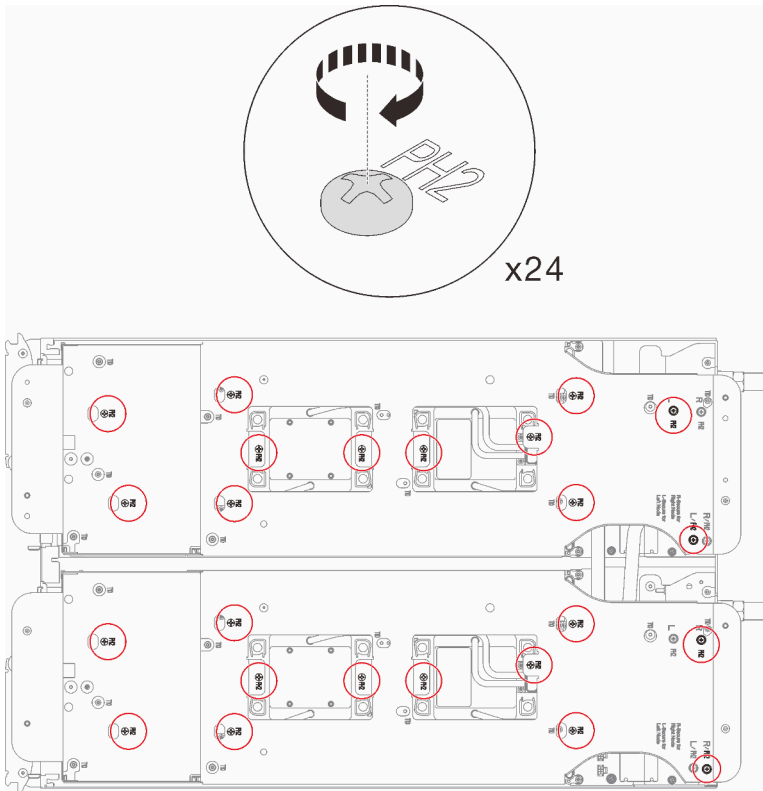


Figure 26. Water loop carrier screws installation

Step 7. Loosen processors properly.

- a. ① Fully loosen all Torx T30 captive screws (16x Torx T30 captive screws for two nodes) on cold plates in the removal sequence shown on the cold plate label (with a torque screwdriver set to the proper torque).

Note: For reference, the torque required for the screws to be fully tightened/removed is 10+/- 2.0 lbf-in, 1.1+/- 0.2 N-m.

Attention: To prevent damage to components, make sure that you follow the indicated loosening sequence.

- b. ② Rotate all anti-tilt wire bails (16x anti-tilt wire bails for two nodes) inwards to the unlocked position.

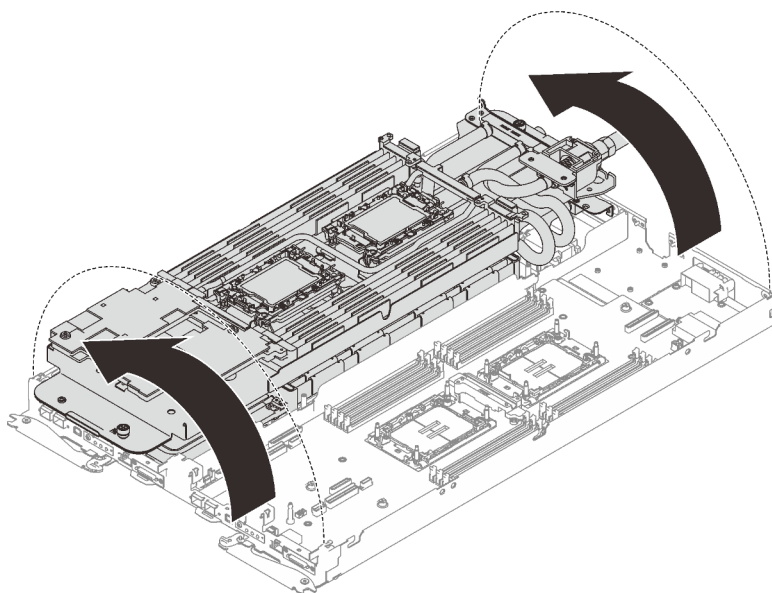


Figure 28. Folding the water loop

Step 9. Fasten two captive thumbscrews to secure water loop carriers to each other.

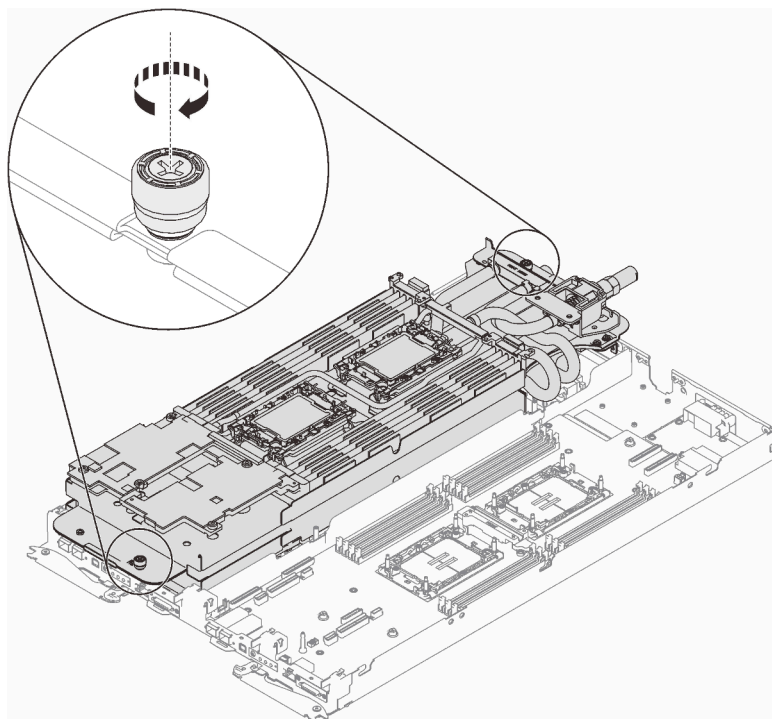


Figure 29. Tightening captive thumbscrews

Step 10. Remove the processor from the retainer. This process differs by processor SKU. Check the processor SKU and follow the applicable procedure.

Note: Do not touch the contacts on the processor.

For non Intel® Xeon® CPU Max processor

1. ① Lift the handle to release the processor from the retainer.
2. ② Carefully hold the processor by its edges; then, lift the processor from the retainer.

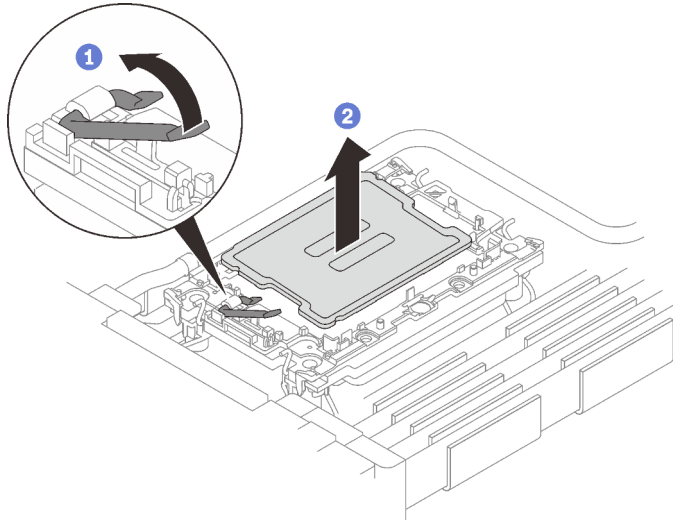


Figure 30. Processor removal

For Intel® Xeon® CPU Max processor

1. ① Insert a flat head screwdriver into the TIM breaking cam on the retainer; then, slightly rotate the flat head screwdriver to release the processor from the retainer.
2. ② Carefully hold the processor by its edges; then, lift the processor from the retainer.

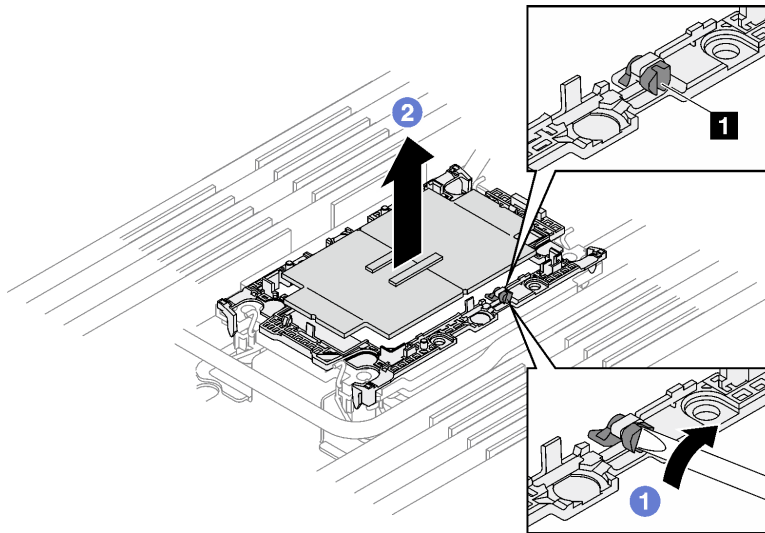


Figure 31. Processor removal (Intel® Xeon® CPU Max processor)

① TIM breaking cam

Step 11. Without putting the processor down, wipe the thermal grease from the top of the processor with an alcohol cleaning pad; then, place the processor on a static protective surface with the processor-contact side up.

Step 12. Remove the processor retainer from the underside of the cold plate.

Note: The processor retainer will be discarded and replaced with a new one.

- a. ① Carefully release the retaining clips from the cold plate.
- b. ② Lift the retainer from the cold plate.

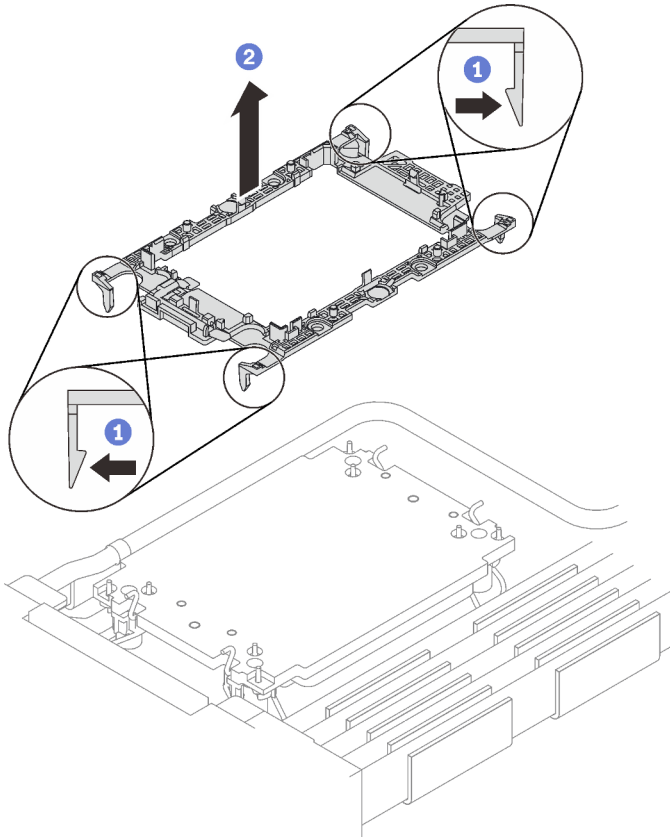


Figure 32. Processor retainer removal

Step 13. Wipe the thermal grease from the bottom of the cold plate with an alcohol cleaning pad.

Step 14. Carefully lift the water loop up off the system board and out of the node.

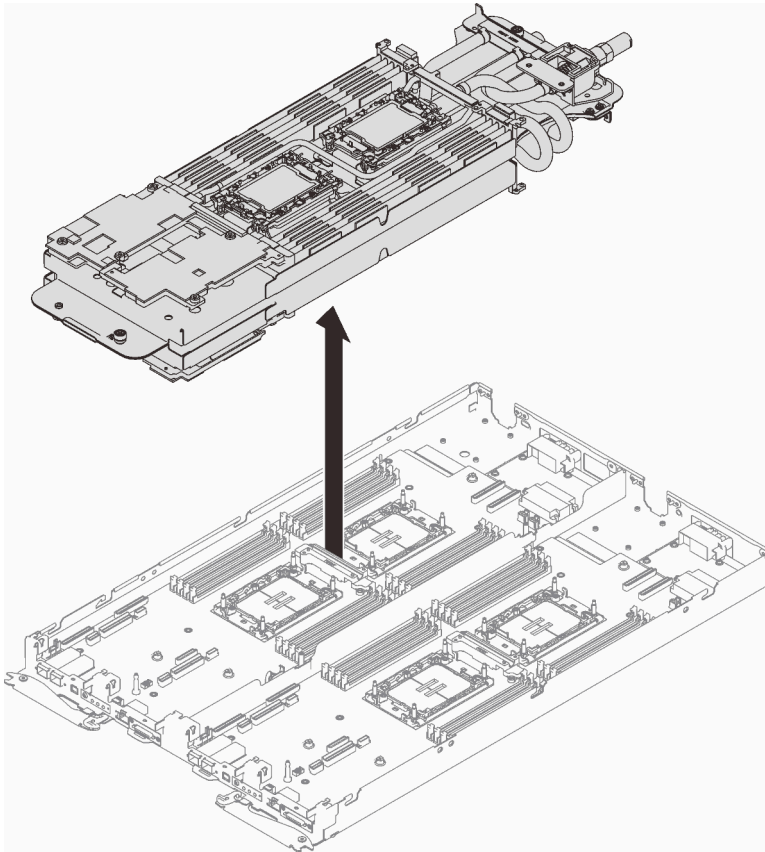


Figure 33. Water loop removal

Step 15. Flip the water loop, and place it on a flat surface. Repeat Step 10 to Step 13 to remove processors from the other side of the water loop.

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

[Watch the procedure on YouTube](#)

Install the water loop

Use this information to install the water loop in the SD650 V3 tray.

About this task

Required tools

Make sure you have the required tools listed below in hand to properly replace the component.

- Water loop kits
 - SD650 V3 Water loop service kit
 - Conduction plate parts (only damaged parts need to be replaced)
 - M.2 Putty pad kit

- Drive gap pad or putty pad kits according to the drives installed in the tray. See their respective replacement procedures for more information.
- ConnectX series adapter putty pad kits according to the ConnectX adapter installed in the tray. See their respective replacement procedures for more information.
- Screws and screwdrivers

Prepare the following screwdrivers to ensure you can install and remove corresponding screws properly.

Screwdriver Type	Screw Type
Torx T10 head screwdriver	Torx T10 screw
Torx T30 head screwdriver	Torx T30 screw
Phillips #1 head screwdriver	Phillips #1 screw
Phillips #2 head screwdriver	Phillips #2 screw

Important: Gap pad/putty pad replacement guidelines

- To identify the gap pad/putty pad location and orientation, see [“Gap pad/Putty pad identification and location” on page 40](#).
- Before replacing the gap pad/putty pad, gently clean the interface plate or the hardware surface with an alcohol cleaning pad.
- Hold the gap pad/putty pad carefully to avoid deformation. Make sure no screw hole or opening is blocked by the gap pad/putty pad material.
- Do not use expired putty pad. Check the expiry date on putty pad package. If the putty pads are expired, acquire new ones to properly replace them.

Attention:

- Read [“Installation Guidelines” on page 31](#) and [“Safety inspection checklist” on page 32](#) to ensure that you work safely.
- Turn off the corresponding DWC tray that you are going to perform the task on.
- Disconnect all external cables from the enclosure.
- Use extra force to disconnect QSFP cables if they are connected to the solution.
- To avoid damaging the water loop, always use the water loop carrier when removing, installing or folding the water loop.

Procedure

Step 1.

Attention: Make sure that the retaining clips on all memory module connectors are in the locked position.

Step 2. Follow the following steps if you are replacing processors:

- If there is any old thermal grease on the processor and the cold plate, gently clean the top of the processor and the cold plate using an alcohol cleaning pad.
- Remove the processor identification label from the water loop and replace it with the new label that comes with the replacement processor. If you are unable to remove the label and place it on the new water loop, or if the label is damaged during transfer, write the processor serial number from the processor identification label on the new water loop in the same location as the label would be placed using a permanent marker.

- c. Apply the thermal grease on the top of the processor with syringe by forming four uniformly spaced dots, while each dot consists of about 0.1 ml of thermal grease

Note: Carefully place the processor and retainer on a flat surface with the processor-contact side down.

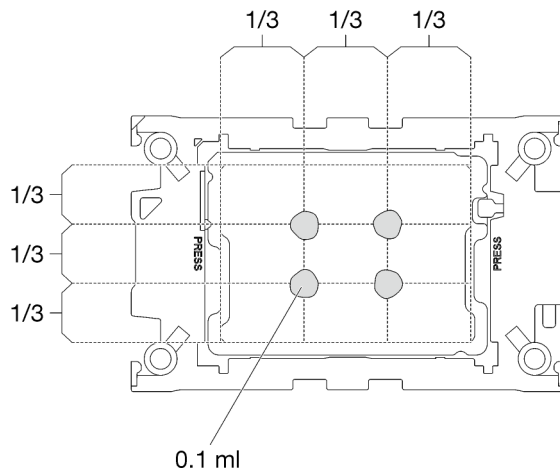


Figure 34. Thermal grease application

Step 3. Install processor retainers onto processor if needed.

- a. Align the triangular mark on the processor retainer with the triangular mark on the processor corner edge.
- b. **(Intel® Xeon® CPU Max only)** Make sure the slot on the TIM breaking cam is vertical. See Figure 4.
- c. Gently place the processor retainer on the processor; then, carefully press the four sides of the processor retainer to secure the processor.

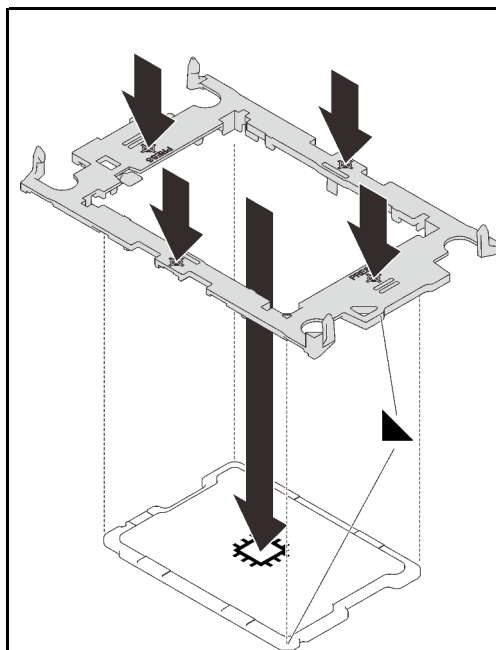


Figure 35. Installing a processor retainer

1 TIM breaking cam

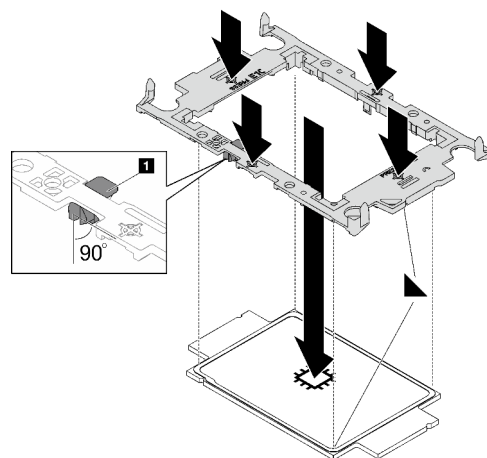


Figure 36. Installing a Intel® Xeon® CPU Max processor retainer

- d. **(Intel® Xeon® CPU Max only)** After installing the retainer onto processor, make sure the slot on the TIM breaking cam is vertical.

1 TIM breaking cam

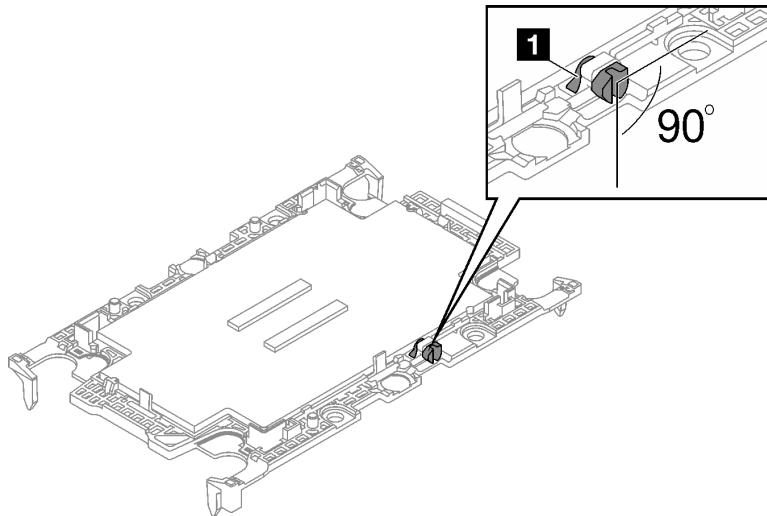


Figure 37. TIM breaking cam on processor retainer

Step 4. When removing the water loop from the package box, **make sure** to hold the touch points marked in grey in the illustration below.

Attention: Holding the water loop anywhere other than the touch points may cause damage to it.

Top image	Isometric view of water loop
Bottom image	Top view of the water loop

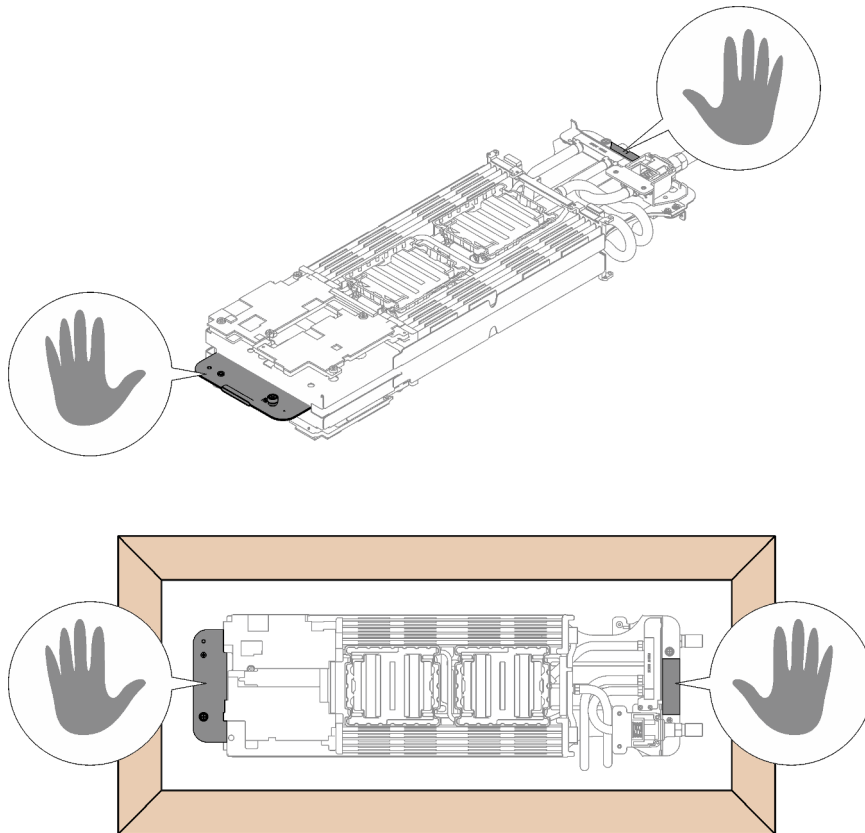


Figure 38. Touching points when removing water loop from package box

Step 5. Remove two plastic grease covers if needed.

- a. ① Use a pair of scissors to cut off the tape.
- b. ② Remove plastic grease covers from the underside of water loop cold plates.

Note: The right node is shown as example. Remove plastic grease covers if needed when installing processor in either node.

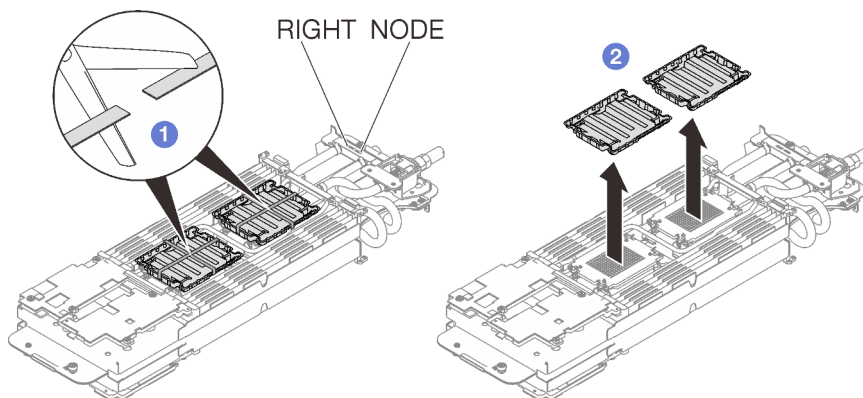


Figure 39. Plastic grease covers removal

Step 6. Align the triangular marks on the processor retainers with the triangular slots on the underside of the water loop cold plate; then, attach the processors to the underside of the water loop cold plate by inserting the processor retainer posts and clips features into the openings at the four corners of the cold plate.

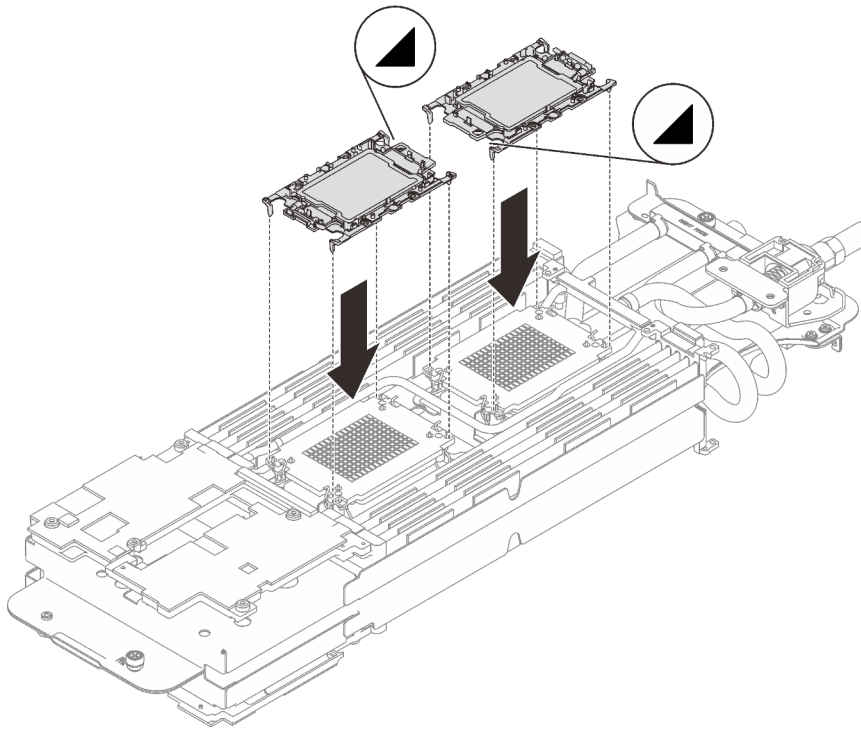


Figure 40. Processor installation

Step 7. Rotate all anti-tilt wire bails (8x anti-tilt wire bails per node) outwards to the unlocked position.

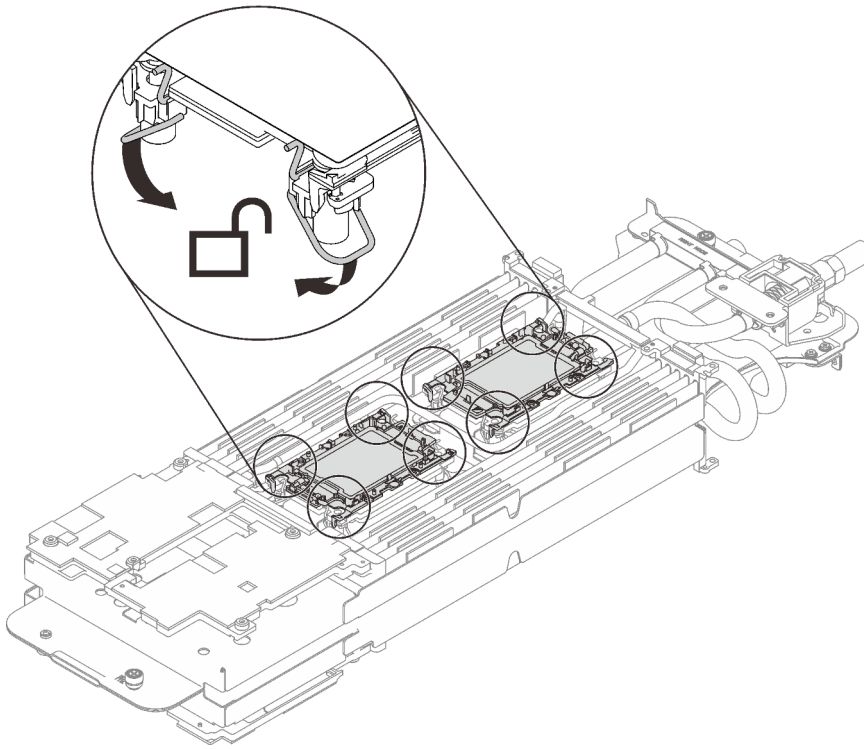


Figure 41. Processor unlocked position

Step 8. Check the gap pads on the water loop, if any of them are damaged or detached, replace them with the new ones.

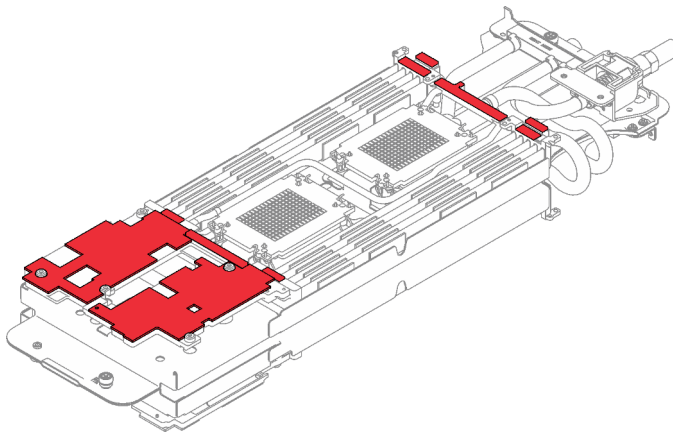


Figure 42. Water loop gap pads

Make sure to follow [Gap pad/putty pad replacement guidelines](#).

Step 9. Install the one side of the water loop.

- a. ① Carefully hold the water loop with both hands and flip it.
- b. ② Carefully position the water loop onto the two guide pins near the rear of the node; then, gently lower down the water loop and ensure it is seated firmly on the system board.

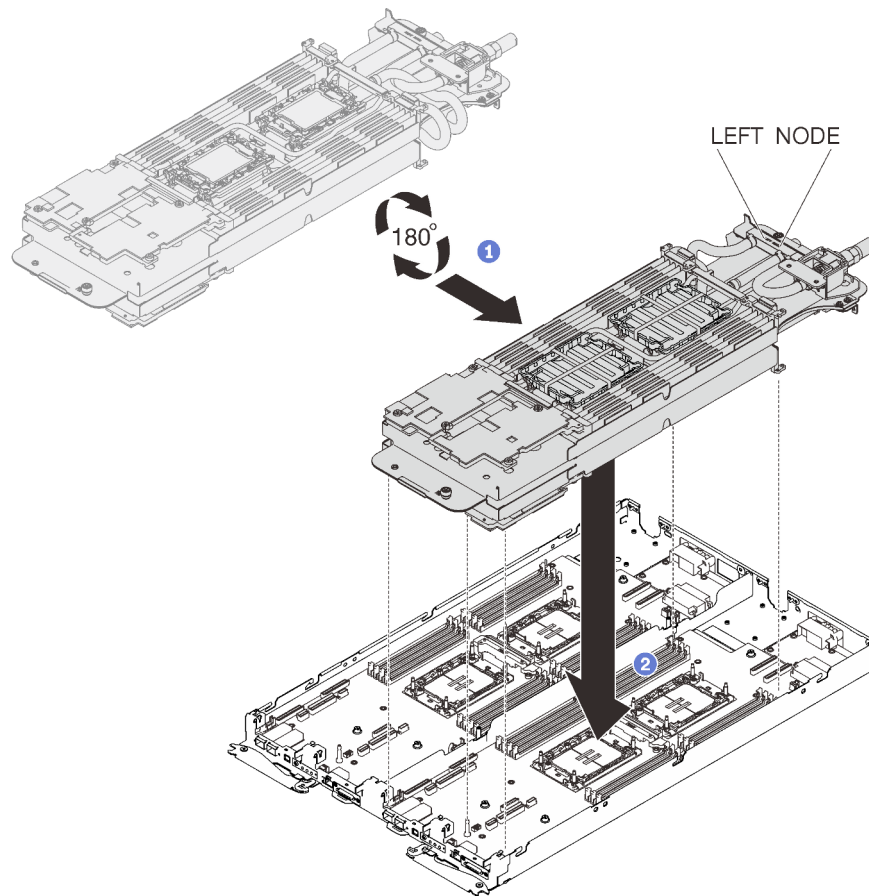


Figure 43. Water loop carrier installation

- Step 10. Repeat step 2 to step 5 to install processors to the other side of the water loop.
- Step 11. Repeat step 6 to make sure gap pads are securely attached to water loop.
- Step 12. Fully loosen two captive thumbscrews located at each end of the water loop carrier.

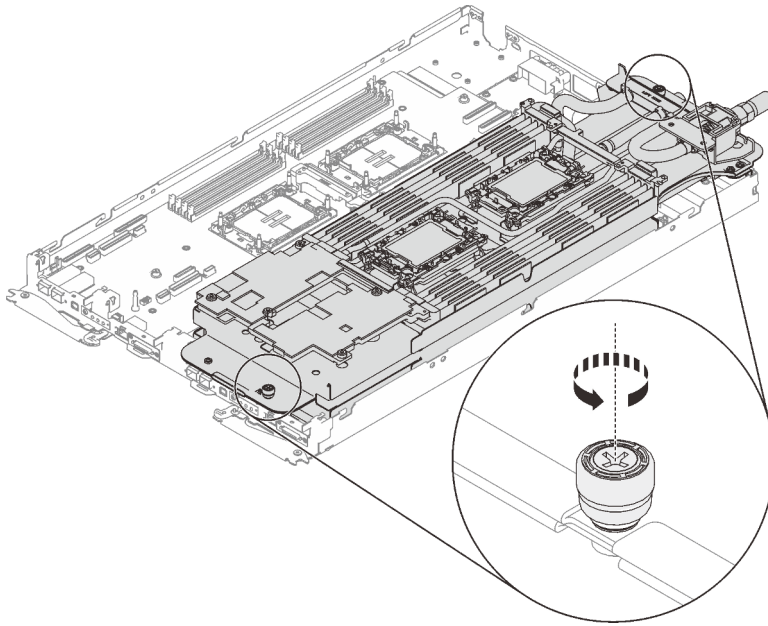


Figure 44. Loosening captive thumbscrews

Step 13. Unfold and install the other side of the water loop as shown.

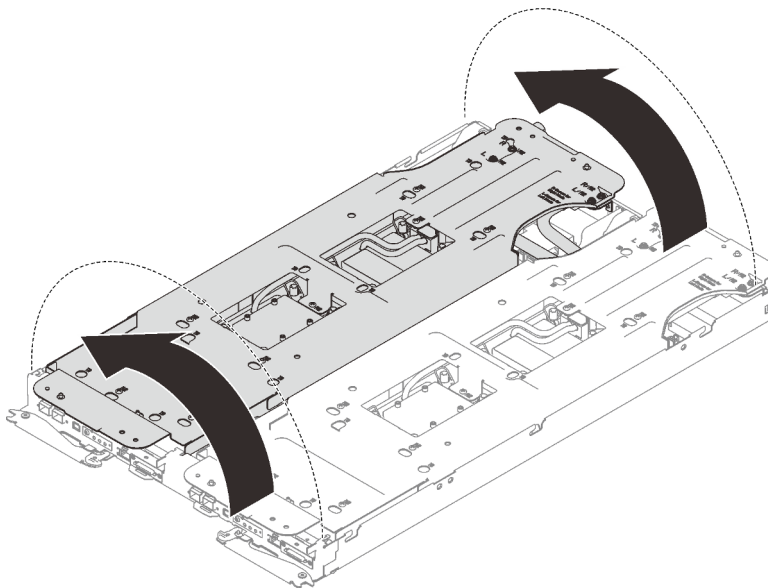


Figure 45. Unfolding water loop

Step 14. Ensure the processors are secured properly.

1. ① Rotate anti-tilt wire bails (16x anti-tilt wire bails for two nodes) outwards to the locked position.
2. ② Fully tighten all Torx T30 captive screws (16x Torx T30 captive screws for two nodes) on cold plates in the installation sequence shown on the cold plate label (with a torque screwdriver set to the proper torque).

Note: For reference, the torque required for the screws to be fully tightened/removed is 10+/- 2.0 lbf-in, 1.1+/- 0.2 N-m.

Attention: To prevent damage to components, make sure that you follow the indicated tightening sequence.

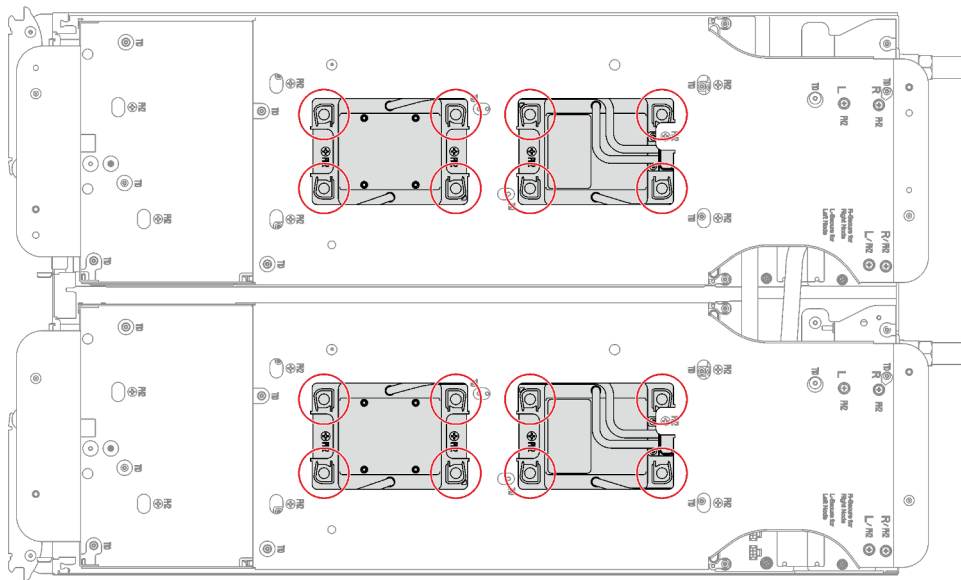
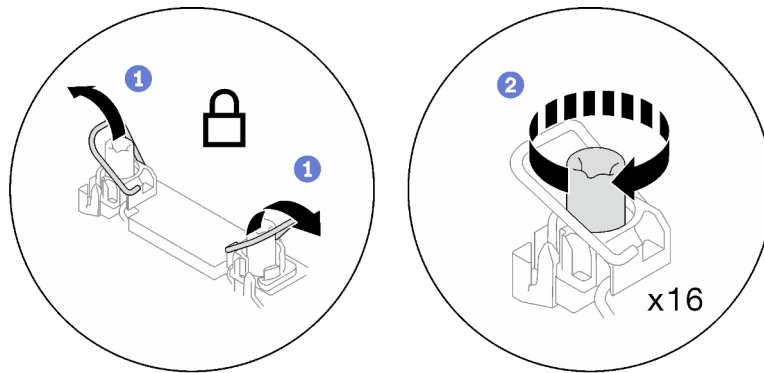


Figure 46. Securing Torx T30 captive screws

Step 15. Loosen water loop carrier screws (24x Phillips #2 screws for two nodes).

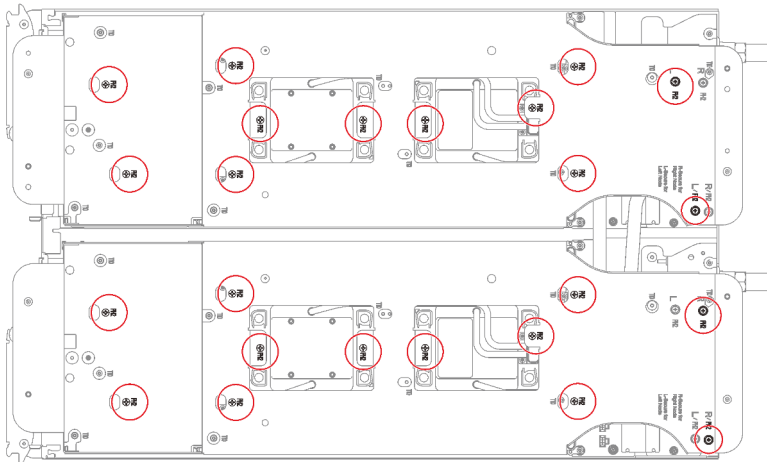
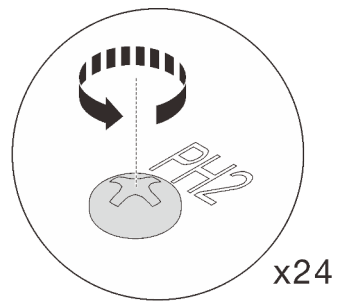


Figure 47. Loosening water loop carrier screws

Step 16. Carefully lift each water loop carrier up and away from the water loop one at a time.

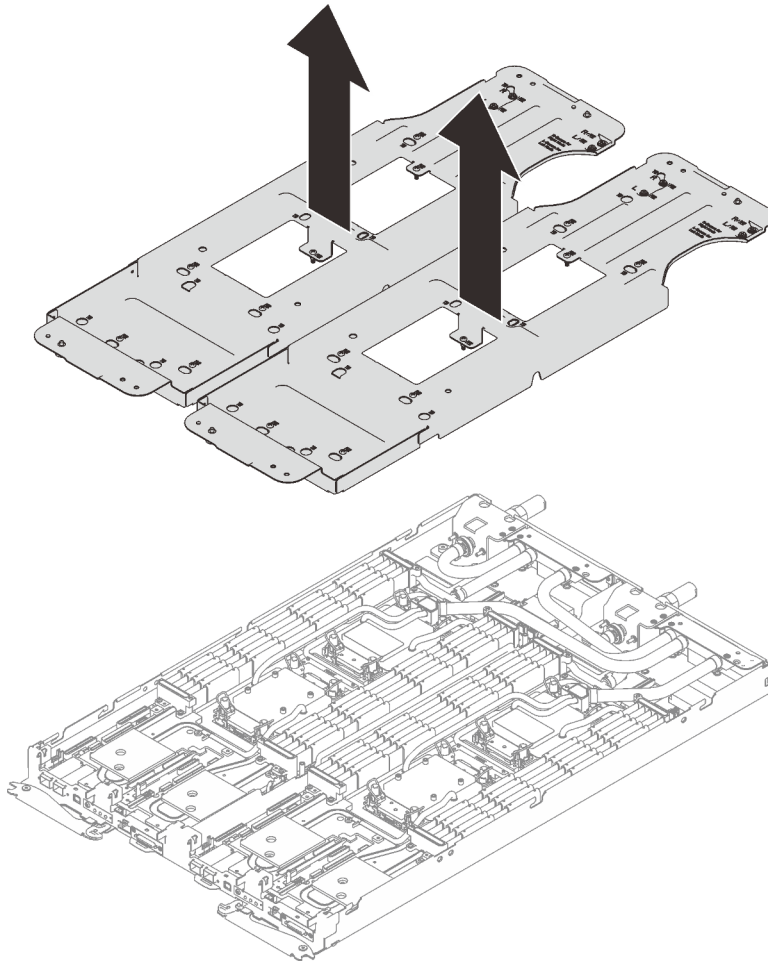


Figure 48. Water loop carrier removal

Step 17. Install water loop screws (18x Torx T10 screws per node) with a torque screwdriver set to the proper torque.

Note: For reference, the torque required for the screws to be fully tightened/removed is 5.0+/- 0.5 lbf-in, 0.55+/- 0.05 N-M.

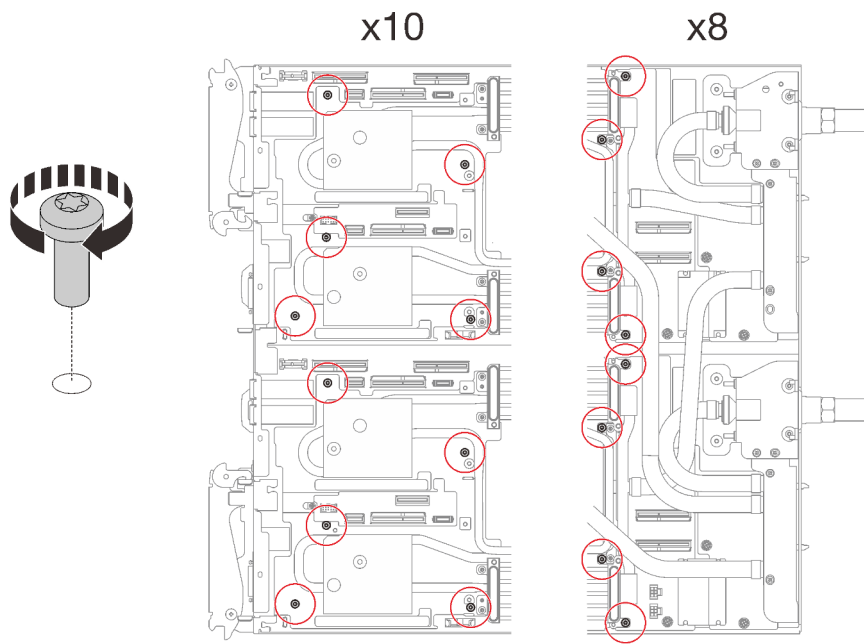


Figure 49. Water loop screws installation

Step 18. Install the following screws to secure the quick connect.

- Four Torx T10 screws to secure the quick connect.
- Ten Torx T10 screws on the rear of the node.

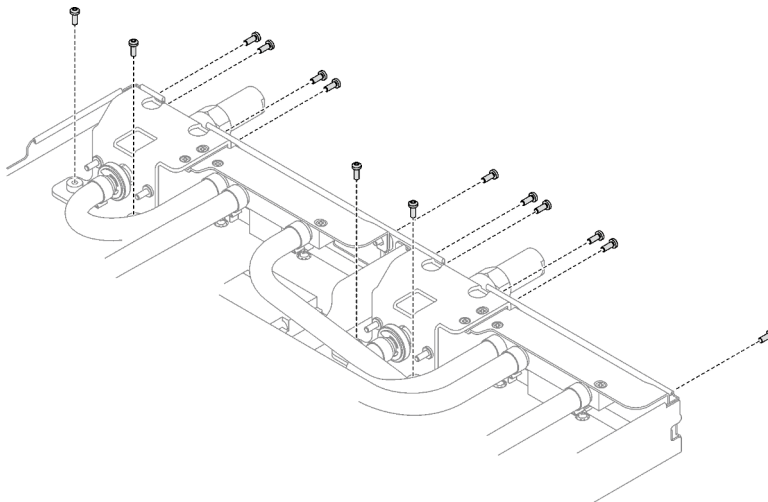


Figure 50. Quick connect screw installation

Step 19. Install two VR clamp plates into the nodes and install Torx T10 screws (4x Torx T10 screws for two nodes).

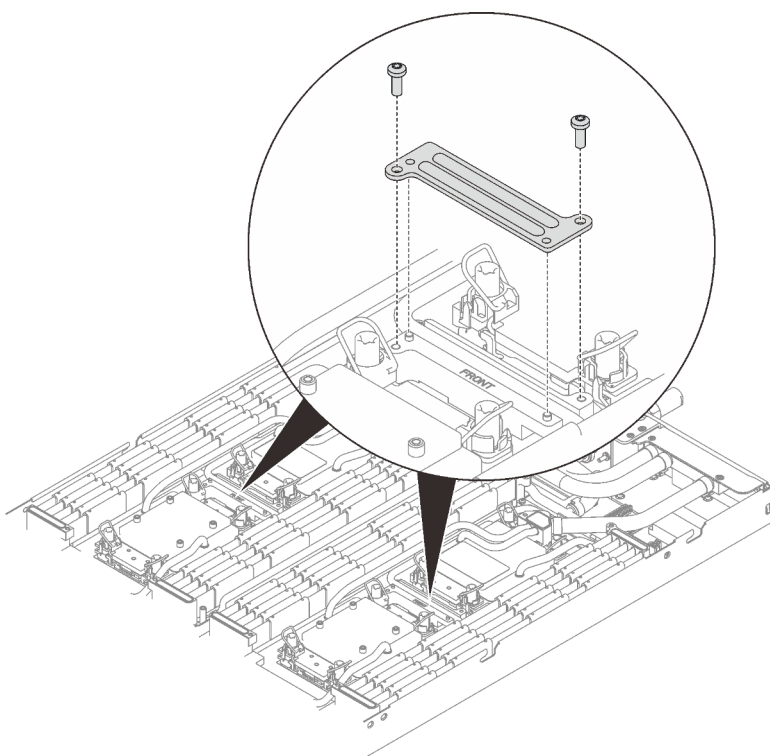


Figure 51. VR clamp plate installation

After you finish

1. Install the PCIe riser assembly. See [“Install a PCIe riser assembly \(ConnectX-6\)” on page 160](#) , [“PCIe riser assembly replacement \(ConnectX-7 NDR 200\)” on page 165](#), or [“Install a PCIe riser assembly \(ConnectX-7 NDR 400\)” on page 181](#).
2. Install the drive cage. See [“Install a drive cage assembly” on page 95](#).
3. Install the M.2 backplane assembly. See [“Install the M.2 backplane assembly” on page 134](#).
4. Install the memory modules. See [“Install a memory module” on page 146](#).
5. Install the DIMM comb. See [“Install a DIMM comb” on page 83](#).
6. Install the cross braces. See [“Install the cross braces” on page 52](#).
7. Install the tray cover. See [“Install the tray cover” on page 49](#).
8. Install the tray into the enclosure. See [“Install a DWC tray in the enclosure” on page 46](#).
9. Connect all required external cables to the solution.

Note: Use extra force to connect QSFP cables to the solution.

10. Check the power LED on each node to make sure it changes from fast blink to slow blink to indicate all nodes are ready to be powered on.

Demo video

[Watch the procedure on YouTube](#)

Replace components in the compute node

Use the following information to remove and install compute node components.

Notes:

- The illustrations in this document are for reference only and might differ slightly from your hardware.
- The replacement procedures in this section uses the right node as an example, the replacement procedures for the left node are similar.

CMOS battery (CR2032) replacement

Use the following procedures to remove and install the CMOS battery (CR2032).

Remove the CMOS battery (CR2032)

Use this information to remove the CMOS battery.

About this task

To avoid possible danger, read and follow the following safety statement.

- **S004**

**CAUTION:**

When replacing the lithium battery, use only Lenovo specified part number or an equivalent type of battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

Do not:

- Throw or immerse into water
- Heat to more than 100°C (212°F)
- Repair or disassemble

Dispose of the battery as required by local ordinances or regulations.

- **S005**

**CAUTION:**

The battery is a lithium ion battery. To avoid possible explosion, do not burn the battery. Exchange it only with the approved part. Recycle or discard the battery as instructed by local regulations.

Attention:

- Read [“Installation Guidelines” on page 31](#) and [“Safety inspection checklist” on page 32](#) to ensure that you work safely.
- Turn off the corresponding DWC tray that you are going to perform the task on.
- Disconnect all external cables from the enclosure.
- Use extra force to disconnect QSFP cables if they are connected to the solution.

- The following notes describe information that you must consider when replacing the battery.
 - Lenovo has designed this product with your safety in mind. The lithium battery must be handled correctly to avoid possible danger. If you replace the battery, you must adhere to the following instructions.
 - If you replace the original lithium battery with a heavy-metal battery or a battery with heavy-metal components, be aware of the following environmental consideration. Batteries and accumulators that contain heavy metals must not be disposed of with normal domestic waste. They will be taken back free of charge by the manufacturer, distributor, or representative, to be recycled or disposed of in a proper manner.
 - After you replace the battery, you must reconfigure the solution and reset the system date and time.

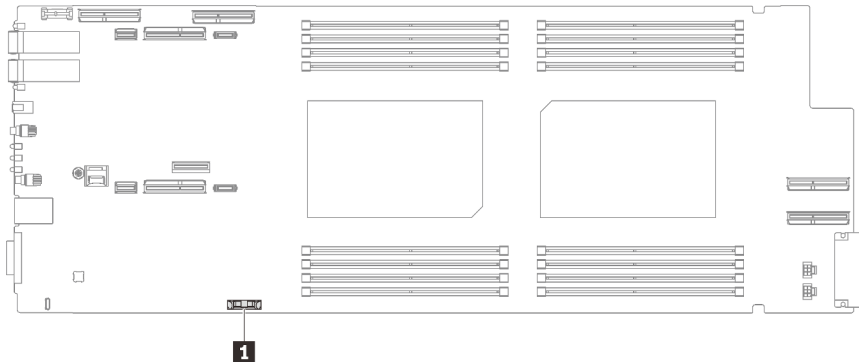


Figure 52. CMOS battery location

Table 21. CMOS battery location

1 CMOS battery

Procedure

Step 1. Make preparations for this task.

- Remove the tray from the enclosure. See [“Remove a DWC tray from the enclosure” on page 45](#).
- Remove the tray cover. See [“Remove the tray cover” on page 48](#).
- Remove the PCIe riser assembly. Depending on your configuration, see [“Remove a PCIe riser assembly \(ConnectX-6\)” on page 156](#), [“PCIe riser assembly replacement \(ConnectX-7 NDR 200\)” on page 165](#), or [“Remove a PCIe riser assembly \(ConnectX-7 NDR 400\)” on page 175](#).

Step 2. Remove the CMOS battery:

Attention: Do not lift the battery by using excessive force. Failing to remove the battery properly may damage the socket on the system board. Any damage to the socket may require replacing the system board.

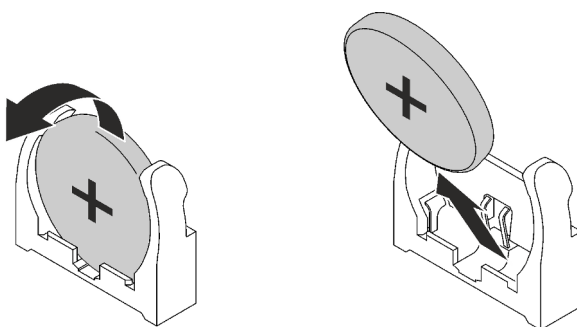


Figure 53. CMOS battery removal

- a. Pivot the battery toward the middle of the compute node.
- b. Lift the battery from the socket.

Step 3. Dispose of the CMOS battery as required by local ordinances or regulations.

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

[Watch the procedure on YouTube](#)

Install the CMOS battery (CR2032)

Use this information to install the CMOS battery.

About this task

To avoid possible danger, read and follow the following safety statement.

- **S004**



CAUTION:

When replacing the lithium battery, use only Lenovo specified part number or an equivalent type of battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

Do not:

- Throw or immerse into water
- Heat to more than 100°C (212°F)
- Repair or disassemble

Dispose of the battery as required by local ordinances or regulations.

- **S005**

**CAUTION:**

The battery is a lithium ion battery. To avoid possible explosion, do not burn the battery. Exchange it only with the approved part. Recycle or discard the battery as instructed by local regulations.

Attention:

- Read [“Installation Guidelines” on page 31](#) and [“Safety inspection checklist” on page 32](#) to ensure that you work safely.
- The following notes describe information that you must consider when replacing the system battery in the node.
 - When replacing the system battery, you must replace it with a lithium battery of the same type from the same manufacturer.
 - After you replace the system-board battery, you must reconfigure the node and reset the system date and time.

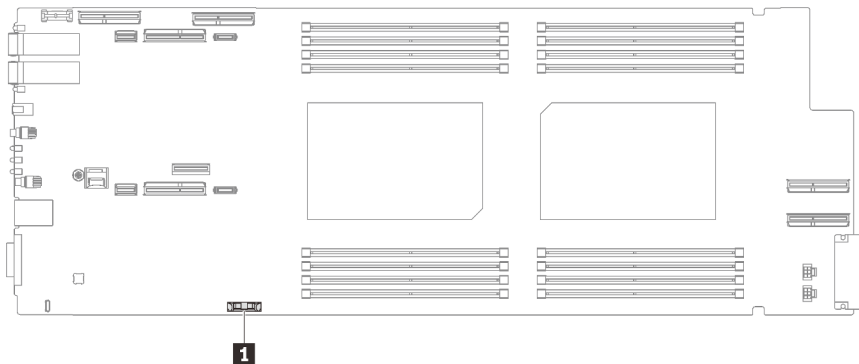


Figure 54. CMOS battery location

Table 22. CMOS battery location

1 CMOS battery

Procedure

Step 1. Follow any special handling and installation instructions that come with the CMOS battery.

Step 2. Insert the new CMOS battery:

- a. Face the positive (+) symbol to the center of the node; then, place the battery into the seat until it clicks in place.
- b. As you slide the CMOS battery into place, press the top of the CMOS battery into the socket. Make sure that the battery clip holds the battery securely.

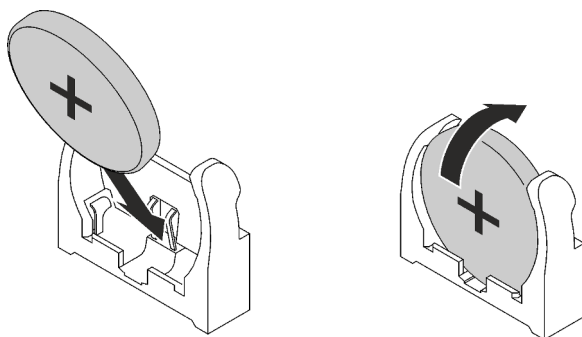


Figure 55. CMOS battery installation

After you finish

1. Install the PCIe riser assembly. See [“Install a PCIe riser assembly \(ConnectX-6\)” on page 160](#) , [“PCIe riser assembly replacement \(ConnectX-7 NDR 200\)” on page 165](#), or [“Install a PCIe riser assembly \(ConnectX-7 NDR 400\)” on page 181](#).
2. Install the tray cover. See [“Install the tray cover” on page 49](#).
3. Install the tray into the enclosure. See [“Install a DWC tray in the enclosure” on page 46](#).
4. Connect all required external cables to the solution.

Note: Use extra force to connect QSFP cables to the solution.

5. Check the power LED on each node to make sure it changes from fast blink to slow blink to indicate all nodes are ready to be powered on.

Demo video

[Watch the procedure on YouTube](#)

DIMM comb replacement

Use the following procedures to remove and install a DIMM comb.

Remove a DIMM comb

Use this information to remove a DIMM comb.

About this task

Attention:

- Read [“Installation Guidelines” on page 31](#) and [“Safety inspection checklist” on page 32](#) to ensure that you work safely.
- Turn off the corresponding DWC tray that you are going to perform the task on.
- Disconnect all external cables from the enclosure.
- Use extra force to disconnect QSFP cables if they are connected to the solution.

Note: The following illustration might differ slightly from your hardware, but the installation method is the same.

Watch the procedure

A video of this procedure is available at YouTube: https://youtube.com/playlist?list=PLYV5R7hVcs-BQs0NXGCM6ZwVtMOSykxd_.

Procedure

Step 1. Make preparations for this task.

- a. Remove the tray from the enclosure. See [“Remove a DWC tray from the enclosure” on page 45.](#)
- b. Remove the tray cover. See [“Remove the tray cover” on page 48.](#)

Step 2. Remove the memory module tool attached to the DIMM comb.

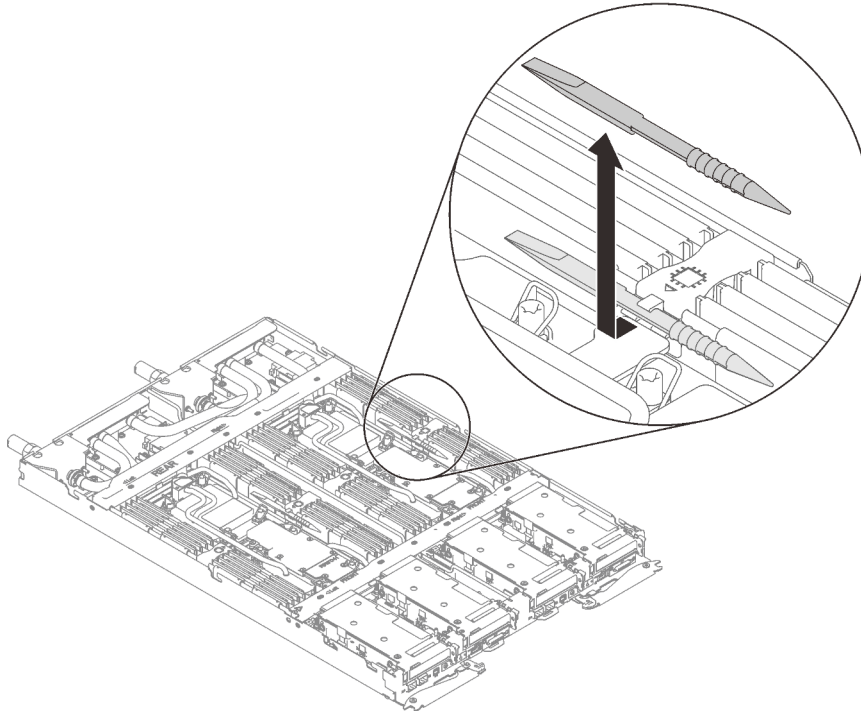


Figure 56. Memory module tool removal

Note: Memory module tool is recommended due to space limitations caused by location of water loop tubes through the memory section.

Step 3. Gently hold the DIMM comb and removal it out of the chassis.

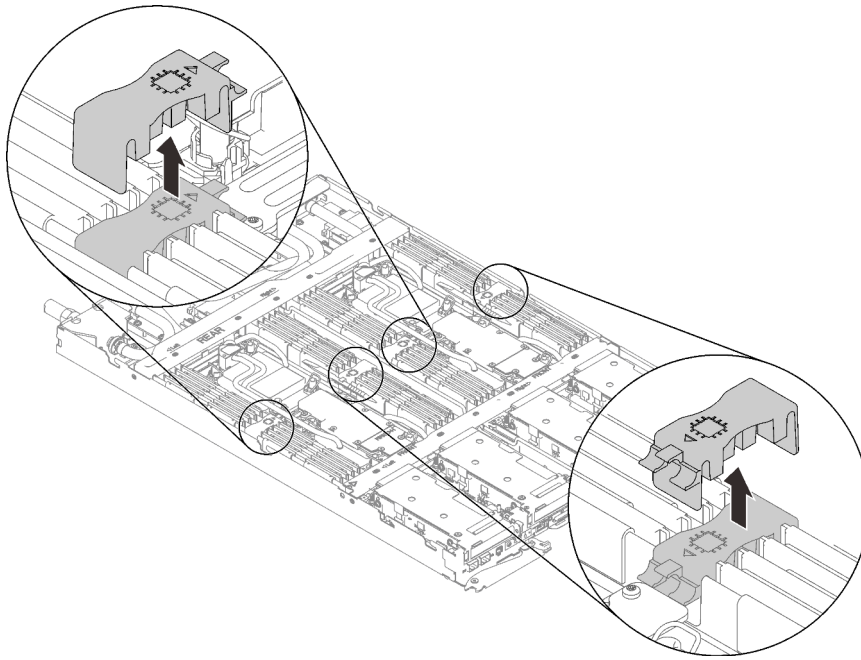


Figure 57. DIMM comb removal

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

[Watch the procedure on YouTube](#)

Install a DIMM comb

Use this information to install a DIMM comb.

About this task

Attention:

- Read [“Installation Guidelines” on page 31](#) and [“Safety inspection checklist” on page 32](#) to ensure that you work safely.
- Make sure to remove or install memory module 20 seconds after disconnecting power cords from the system. It allows the system to be completely discharged of electricity and safe for handling memory module.

Note: The following illustration might differ slightly from your hardware, but the installation method is the same.

Procedure

Note: Make sure to remove or install memory module 20 seconds after disconnecting power cords from the system. It allows the system to be completely discharged of electricity and safe for handling memory module.

Step 1. Align the DIMM comb with the slots and insert it into the node.

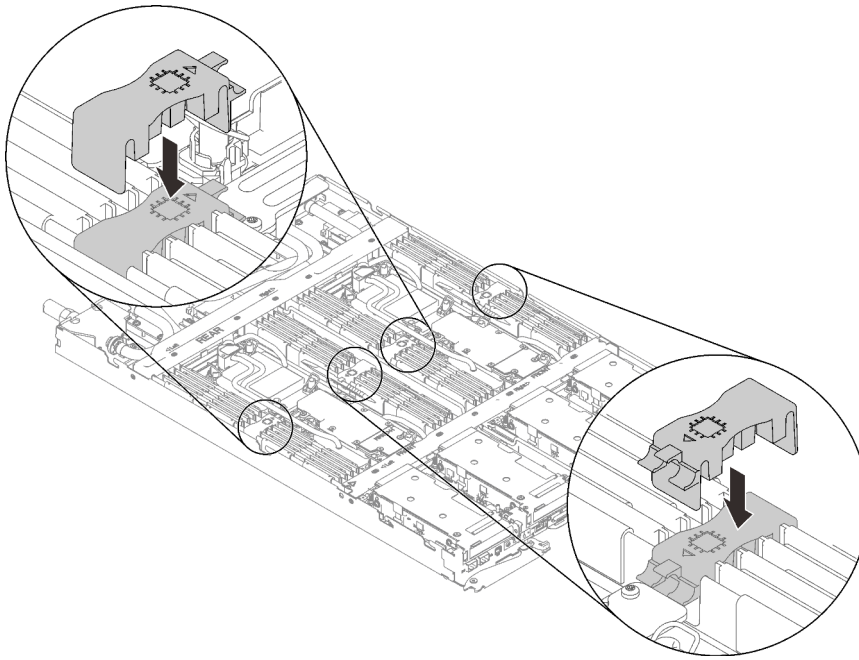


Figure 58. DIMM comb installation

Step 2. Install the memory module tool to the DIMM comb.

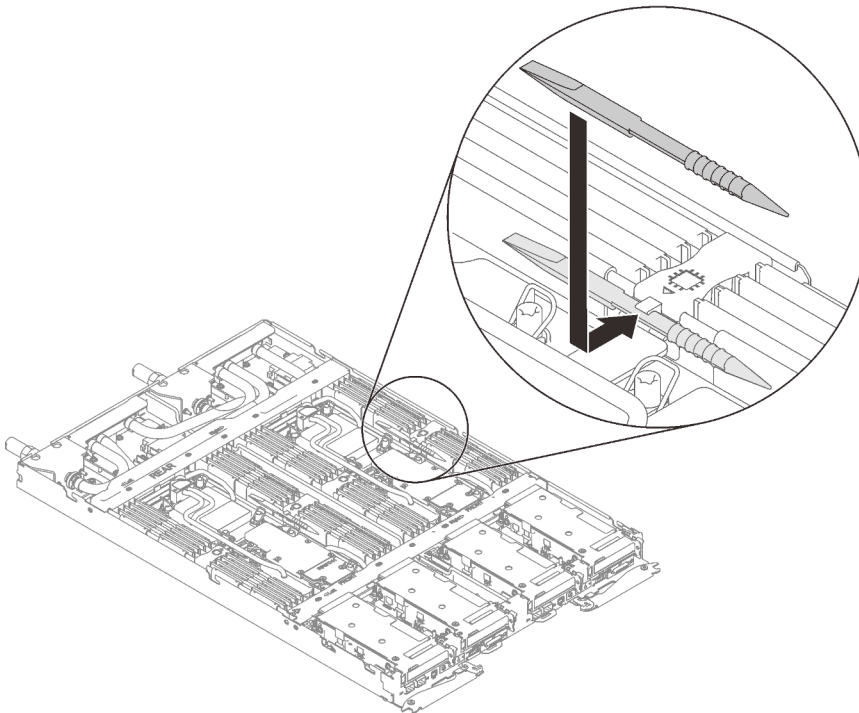


Figure 59. Memory module tool installation

After you finish

1. Install the tray cover. See [“Install the tray cover” on page 49.](#)
2. Install the tray into the enclosure. See [“Install a DWC tray in the enclosure” on page 46.](#)

3. Connect all required external cables to the solution.

Note: Use extra force to connect QSFP cables to the solution.

4. Check the power LED on each node to make sure it changes from fast blink to slow blink to indicate all nodes are ready to be powered on.

Demo video

[Watch the procedure on YouTube](#)

Drive and drive cage assembly replacement

Use the following procedures to remove and install a drive and drive cage assembly.

Remove a drive cage assembly

Use this information to remove a drive cage assembly.

About this task

Required tools

Make sure you have the following kits at hand to properly replace the component:

- SD650 V3 Gap pad kit
- U.2 drive Conduction Plate Parts with gap pad

Attention:

- Read [“Installation Guidelines” on page 31](#) and [“Safety inspection checklist” on page 32](#) to ensure that you work safely.
- Turn off the corresponding DWC tray that you are going to perform the task on.
- Disconnect all external cables from the enclosure.
- Use extra force to disconnect QSFP cables if they are connected to the solution.

Procedure

Step 1. Make preparations for this task.

- a. Remove the tray from the enclosure. See [“Remove a DWC tray from the enclosure” on page 45](#).
- b. Remove the tray cover. See [“Remove the tray cover” on page 48](#).
- c. Remove the cross braces. See [“Remove the cross braces” on page 50](#).

Step 2. Disconnect the cables from the system board.

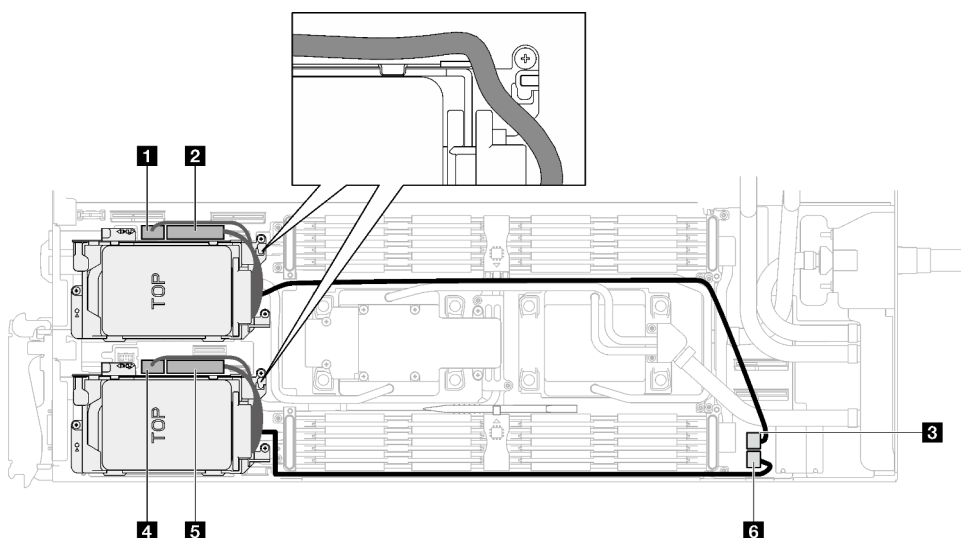


Figure 60. Drive assembly cable routing

1 SATA 0-1 connector
2 NVMe 0-1 connector
3 Drive power 2 connector
4 SATA 2-3 connector
5 NVMe 2-3 connector
6 Drive power 1 connector

Step 3. Remove the drive cage assembly.

- a. ① Remove the 3 screws.
- b. ② Remove the drive assembly out of the node.

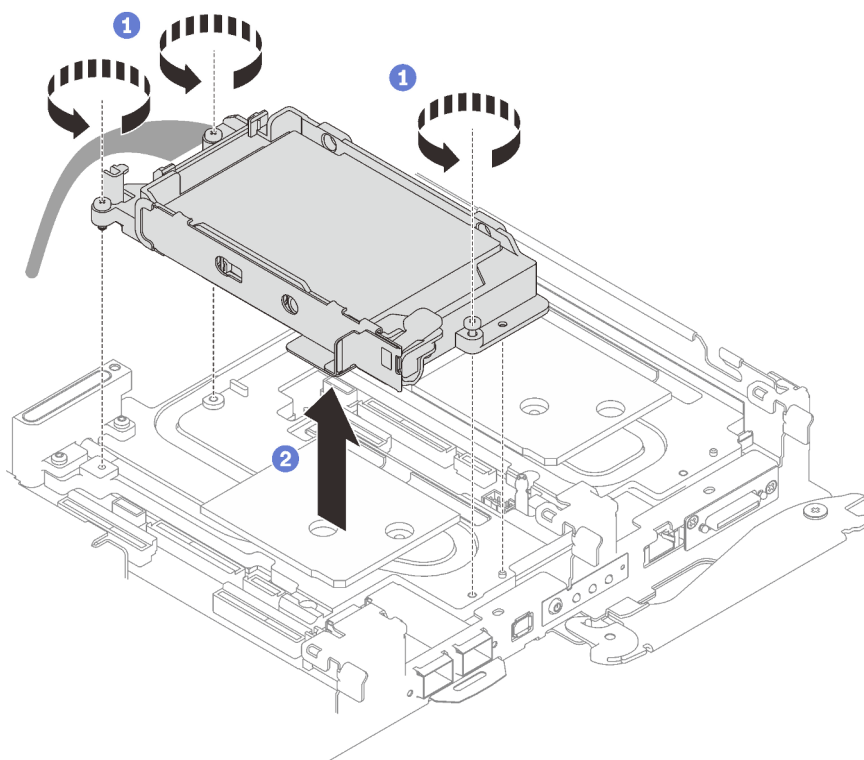


Figure 61. One 15 mm drive cage assembly removal

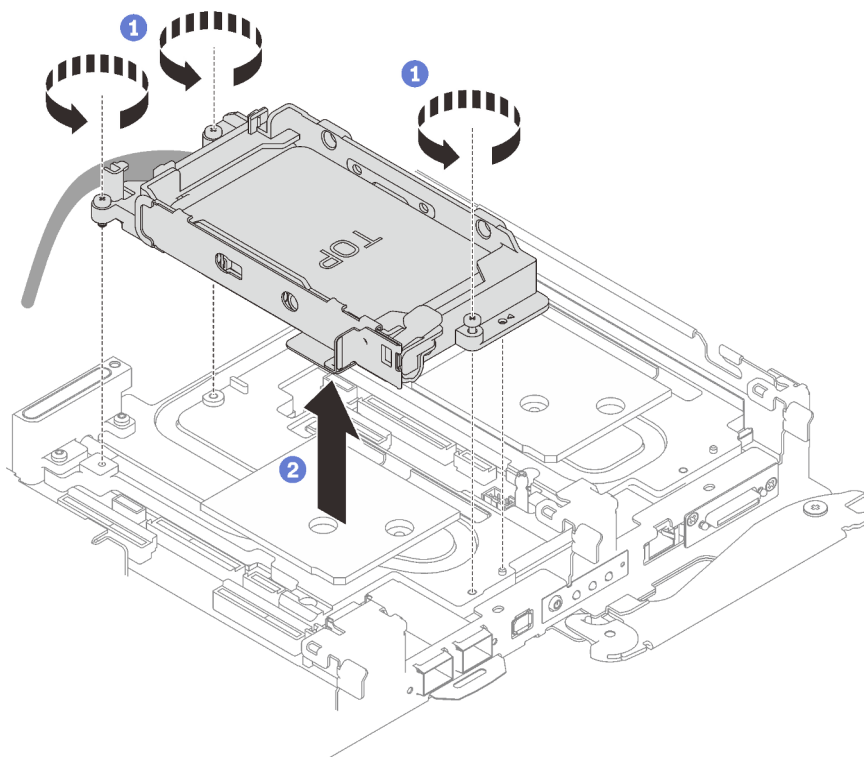


Figure 62. One 7 mm drive cage assembly removal

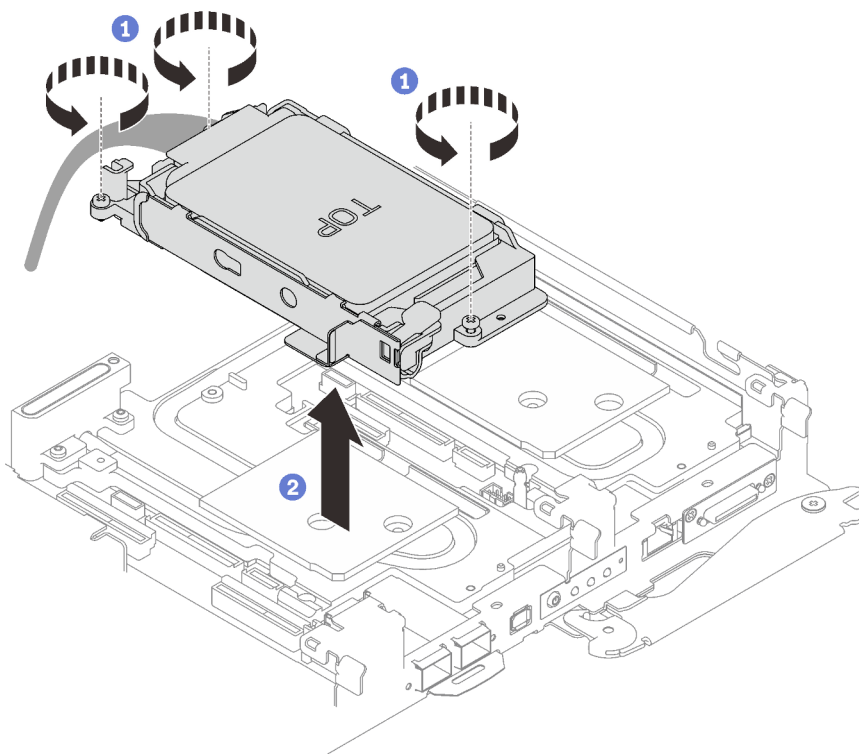


Figure 63. Two 7 mm drive cage assembly removal

Step 4. If necessary, remove the blank bezel fillers.

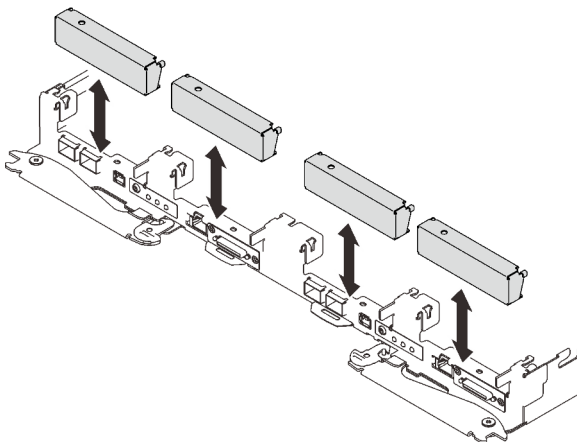


Figure 64. Blank bezel filler removal

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

[Watch the procedure on YouTube](#)

Remove a drive

Use this information to remove a drive.

About this task

Required tools

Make sure you have the following kits at hand to properly replace the component:

- SD650 V3 Gap pad kit
- U.2 drive Conduction Plate Parts with gap pad

Attention:

- Read [“Installation Guidelines” on page 31](#) and [“Safety inspection checklist” on page 32](#) to ensure that you work safely.
- Turn off the corresponding DWC tray that you are going to perform the task on.
- Disconnect all external cables from the enclosure.
- Use extra force to disconnect QSFP cables if they are connected to the solution.

Procedure

Step 1. Make preparations for this task.

- a. Remove the tray from the enclosure. See [“Remove a DWC tray from the enclosure” on page 45](#).
- b. Remove the tray cover. See [“Remove the tray cover” on page 48](#).
- c. Remove the cross braces. See [“Remove the cross braces” on page 50](#).
- d. Remove the drive cage. See [“Remove a drive cage assembly” on page 85](#).

Step 2. There are different procedures for removing one and two drives, follow the steps according to your configuration.

For removing one 7 mm or 15 mm drive only, complete the following steps.

1. ① Remove the drive out of the bottom of the drive cage.
2. ② Disconnect the cable from the drive.

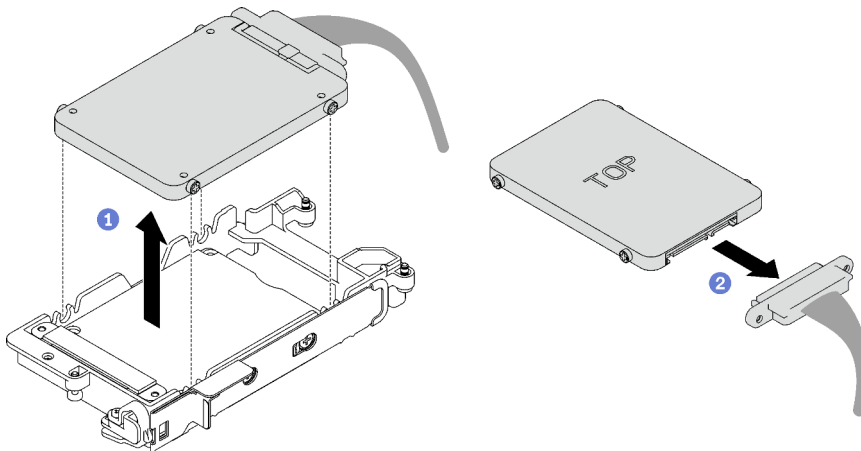


Figure 65. 7 mm drive removal

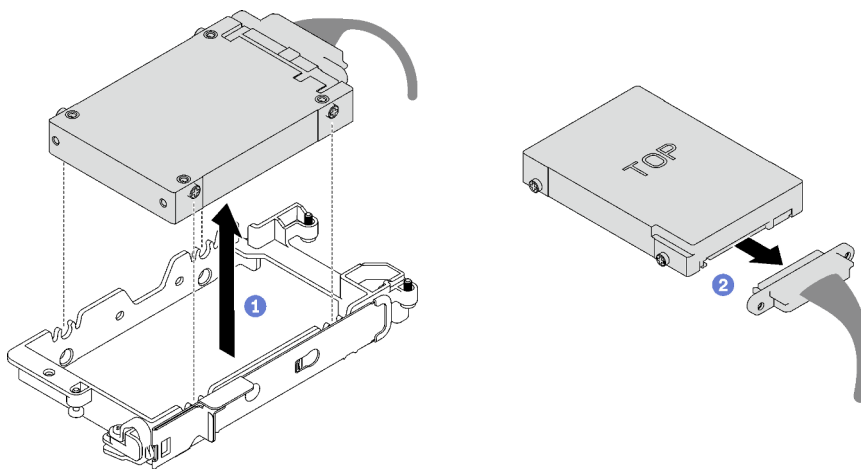


Figure 66. 15 mm drive removal

For removing two 7 mm drives, complete the following steps.

1. Remove the upper drive.
 - a. ① Push and hold the release latch.
 - b. ② Slide the metal tab to the unlocked position.
 - c. ③ Pivot the drive out of the top of the drive cage as shown.
 - d. ④ Disconnect the cable from the drive.

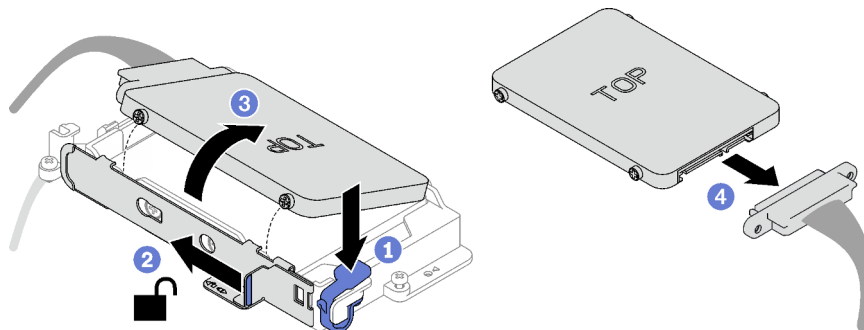


Figure 67. Upper drive removal

2. Remove the lower drive.
 - a. ① Remove the drive out of the bottom of the drive cage.
 - b. ② Disconnect the cable from the drive.

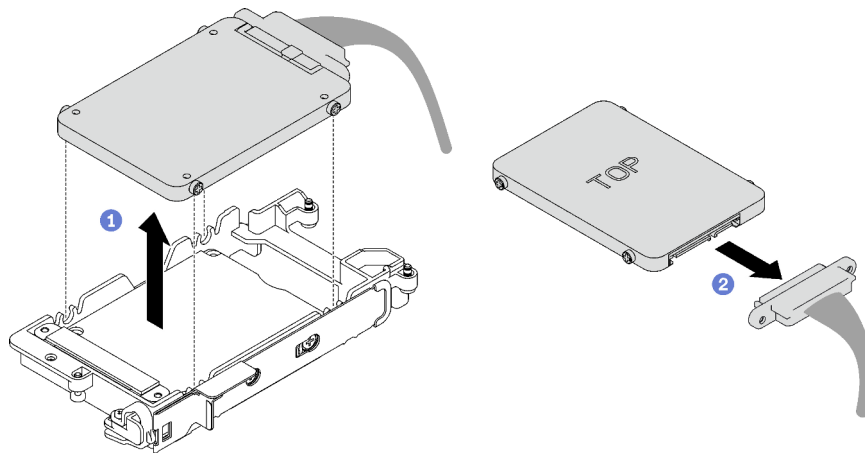


Figure 68. Lower drive removal

3. If necessary, remove the four screws securing the conduction plate and lift it out of the drive cage.

Note: Make sure the metal tab is in the unlocked position.

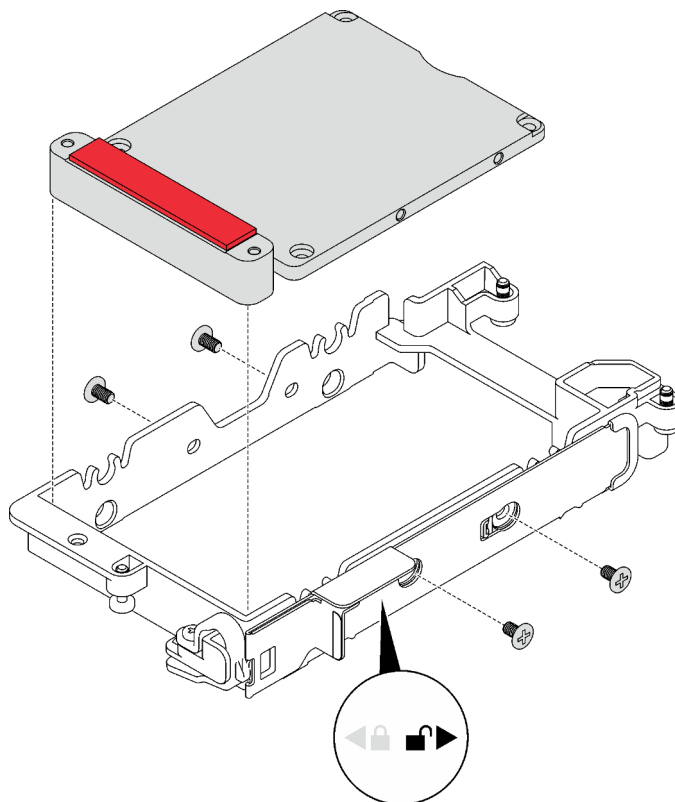


Figure 69. Conduction plate removal

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

[Watch the procedure on YouTube](#)

Install a drive

Use this information to install a drive.

About this task

Required tools

Make sure you have the following kits at hand to properly replace the component:

- SD650 V3 Gap pad kit
- U.2 drive Conduction Plate Parts with gap pad

Important: Gap pad/putty pad replacement guidelines

- To identify the gap pad/putty pad location and orientation, see [“Gap pad/Putty pad identification and location” on page 40](#).
- Before replacing the gap pad/putty pad, gently clean the interface plate or the hardware surface with an alcohol cleaning pad.
- Hold the gap pad/putty pad carefully to avoid deformation. Make sure no screw hole or opening is blocked by the gap pad/putty pad material.
- Do not use expired putty pad. Check the expiry date on putty pad package. If the putty pads are expired, acquire new ones to properly replace them.

Attention:

- Read [“Installation Guidelines” on page 31](#) and [“Safety inspection checklist” on page 32](#) to ensure that you work safely.

Procedure

Step 1. **For installing one 7 mm or 15 mm drive only, complete the following steps.**

1. ① Find the cable with its plugger marked as **SSD 0/2**, and connect it to the drive.
2. ② Flip the drive over.
3. ③ Install the drive into the bottom of the drive cage and make sure it is secured in place.

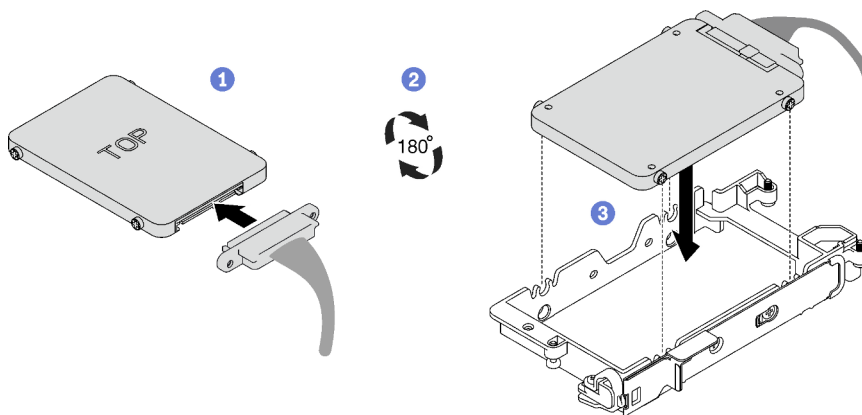


Figure 70. 7 mm drive installation

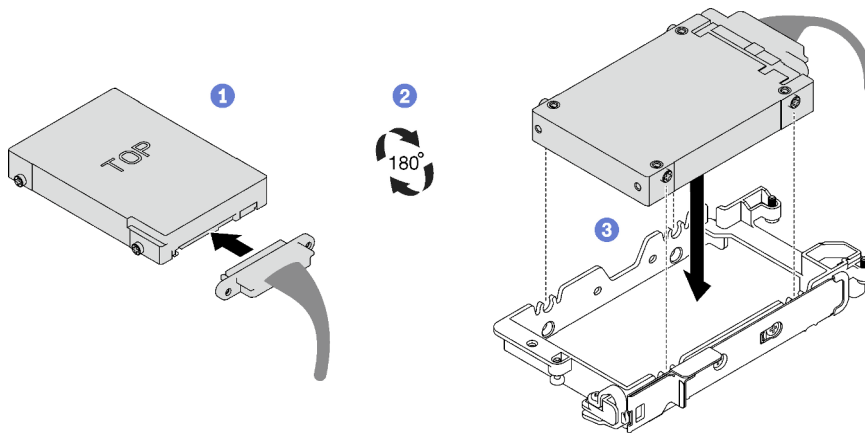
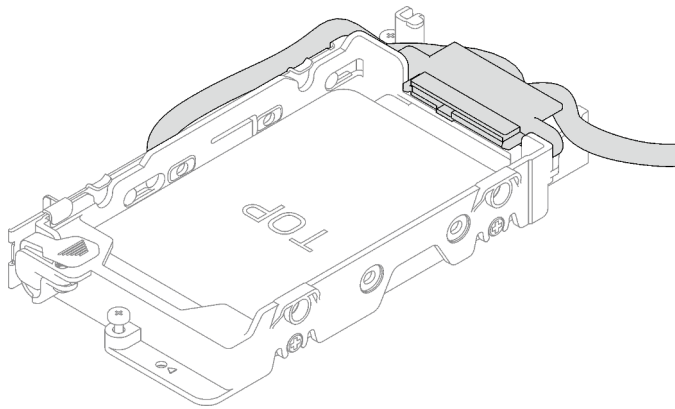


Figure 71. 15 mm drive installation

Note: Secure the unconnected cable plugger on top side of the drive cage.



Step 2. **For installing two 7 mm drives, complete the following steps.**

1. If removed, install the conduction plate into the bottom of the drive cage and secure it with four screws.

There are gap pads located on both side of the conduction plate.

- If the small gap pad (1) is damaged or detached, replace it with a new one.
- If the bigger gap pad (2) is damaged or detached, discard the conduction plate. Then, install a new conduction plate already installed with the two gap pads.

Note: Make sure the metal tab is in the unlocked position.

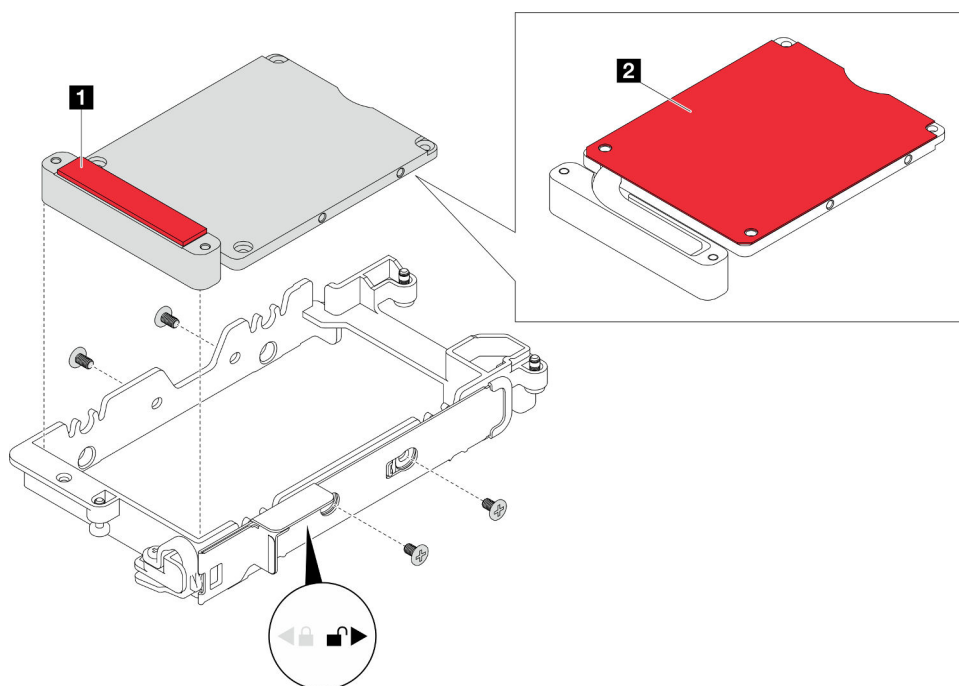


Figure 72. Conduction plate installation

2. Install the lower drive.

- a. ① Find the cable with its plugger marked as **SSD 0/2**, and connect it to the drive.
- b. ② Flip the drive over.
- c. ③ Install the drive into the bottom of the drive cage and make sure it is secured in place.

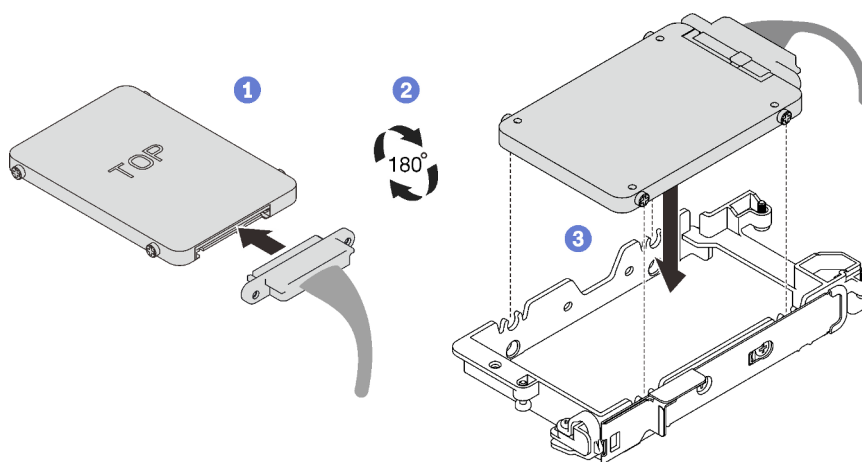


Figure 73. Lower drive installation

3. Install the upper drive.

- a. ① Find the cable with its plugger marked as **SSD 1/3**, and connect it to the drive. Then, pivot the drive into the top of the drive cage as shown.
- b. ② Push and hold the release latch.
- c. ③ Slide the metal tab to the locked position.

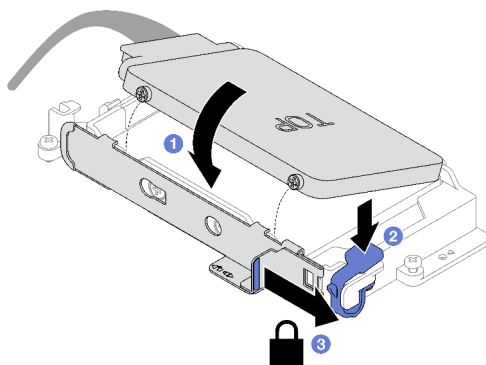


Figure 74. Upper drive installation

After you finish

1. Install the drive cage. See [“Install a drive cage assembly” on page 95](#).
2. Install the cross braces. See [“Install the cross braces” on page 52](#).
3. Install the tray cover. See [“Install the tray cover” on page 49](#).
4. Install the tray into the enclosure. See [“Install a DWC tray in the enclosure” on page 46](#).
5. Connect all required external cables to the solution.

Note: Use extra force to connect QSFP cables to the solution.

6. Check the power LED on each node to make sure it changes from fast blink to slow blink to indicate all nodes are ready to be powered on.

Demo video

[Watch the procedure on YouTube](#)

Install a drive cage assembly

Use this information to install a drive cage assembly.

About this task

Required tools

Make sure you have the following kits at hand to properly replace the component:

- SD650 V3 Gap pad kit
- U.2 drive Conduction Plate Parts with gap pad

Important: Gap pad/putty pad replacement guidelines

- To identify the gap pad/putty pad location and orientation, see [“Gap pad/Putty pad identification and location” on page 40](#).
- Before replacing the gap pad/putty pad, gently clean the interface plate or the hardware surface with an alcohol cleaning pad.
- Hold the gap pad/putty pad carefully to avoid deformation. Make sure no screw hole or opening is blocked by the gap pad/putty pad material.
- Do not use expired putty pad. Check the expiry date on putty pad package. If the putty pads are expired, acquire new ones to properly replace them.

Attention:

- Read [“Installation Guidelines” on page 31](#) and [“Safety inspection checklist” on page 32](#) to ensure that you work safely.
- Ensure the drives are installed correctly into the drive cage assembly. See [“Install a drive” on page 92](#).

Procedure

Step 1. Make sure the blank bezel fillers are installed. If not, install them to the node.

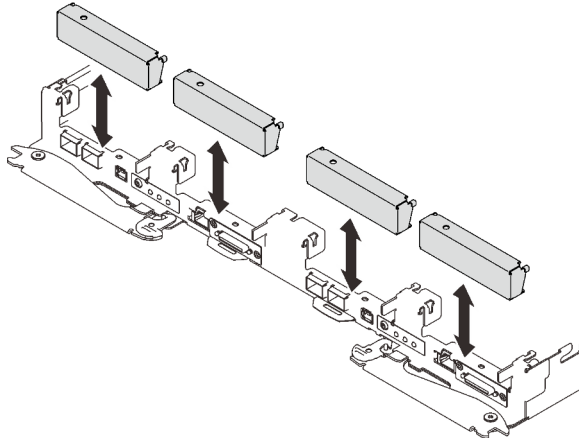


Figure 75. Blank bezel filler installation

Step 2. If the gap pad located on the reverse side of the drive cage is damaged or detached, replace it with a new one. Make sure to follow [Gap pad/putty pad replacement guidelines](#).

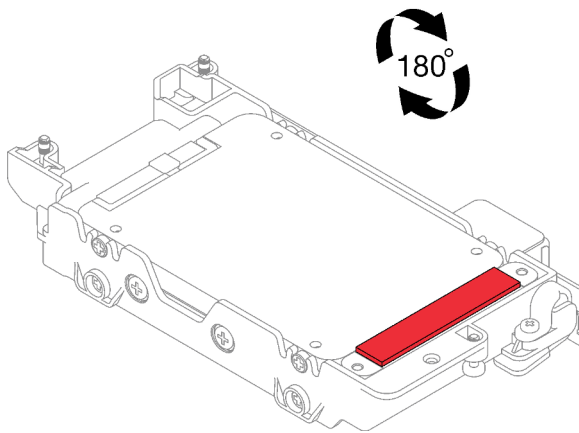


Figure 76. Gap pad location

Step 3. If the drive cage gap pad is damaged or detached, replace it with a new one. See the following for the gap pad location for each drive cage. Make sure to follow [Gap pad/putty pad replacement guidelines](#).

Note: Align the gap pad with marking on water loop when attaching gap pad.

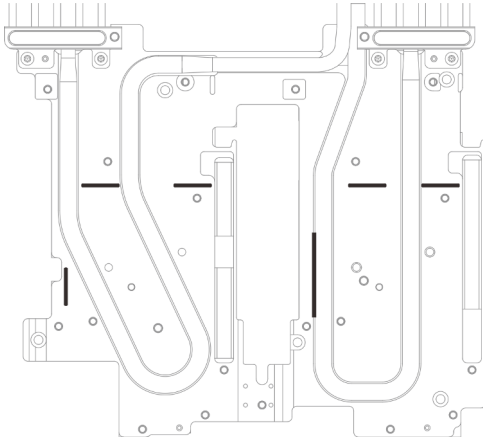


Figure 77. Markings on water loop for gap pad alignment

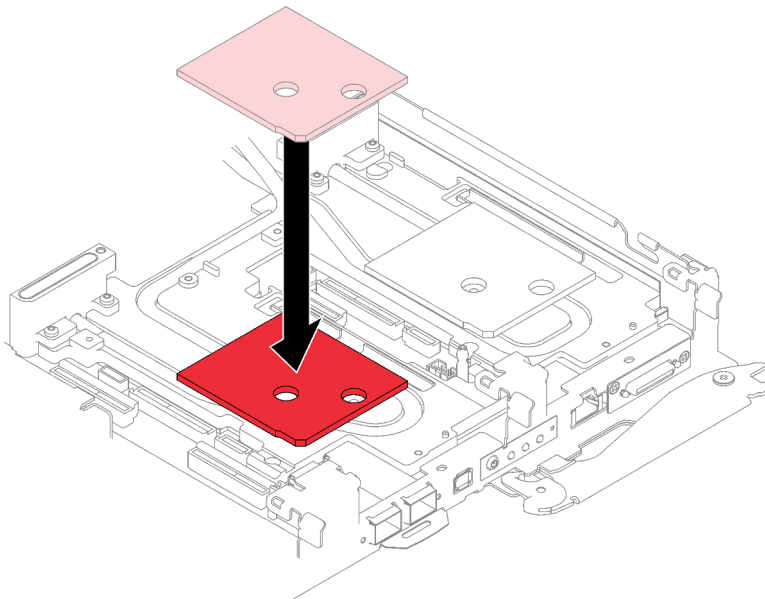


Figure 78. Replacing gap pad

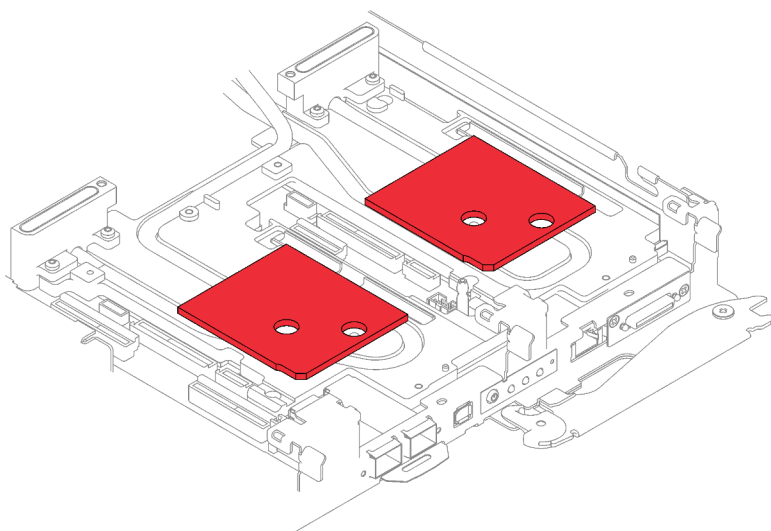


Figure 79. Gap pad locations

- Step 4. Install the drive cage assembly.
- a. ① Install the drive assembly into the node.
 - b. ② Secure the 3 screws.

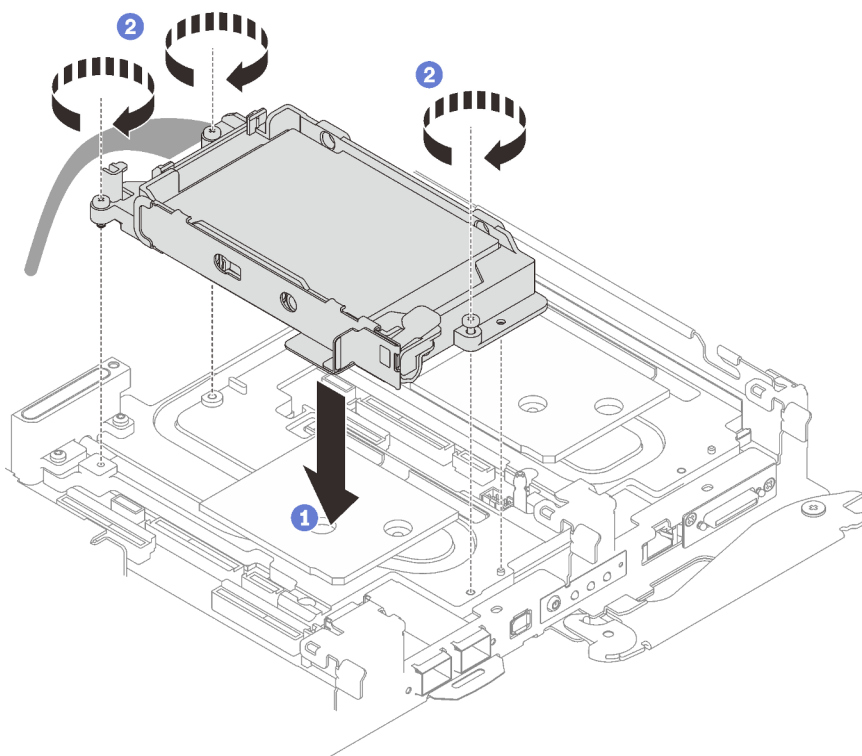


Figure 80. One 15 mm drive cage assembly installation

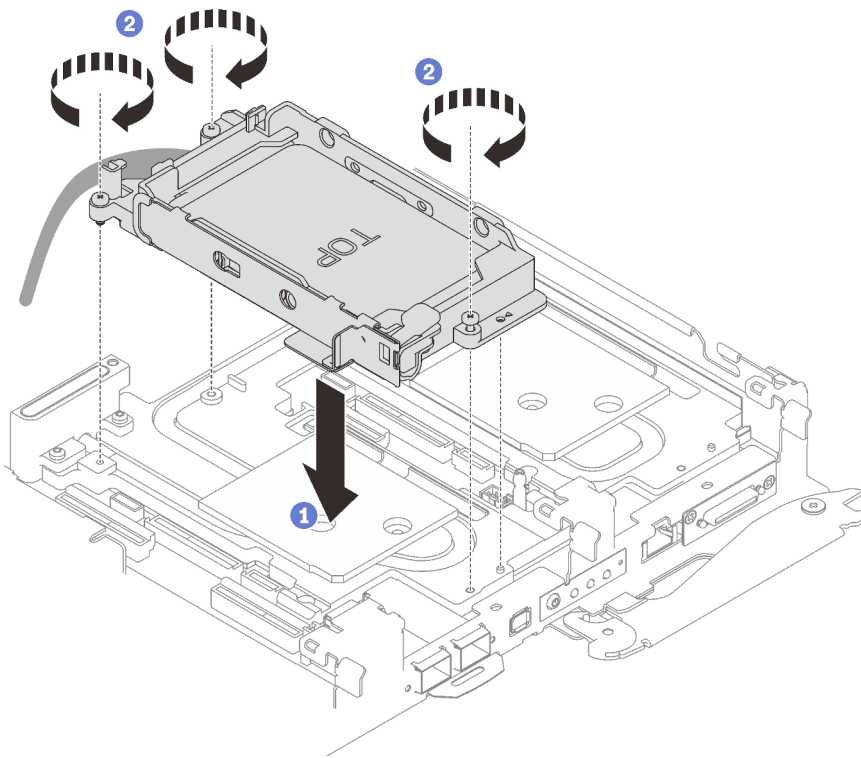


Figure 81. One 7 mm drive cage assembly installation

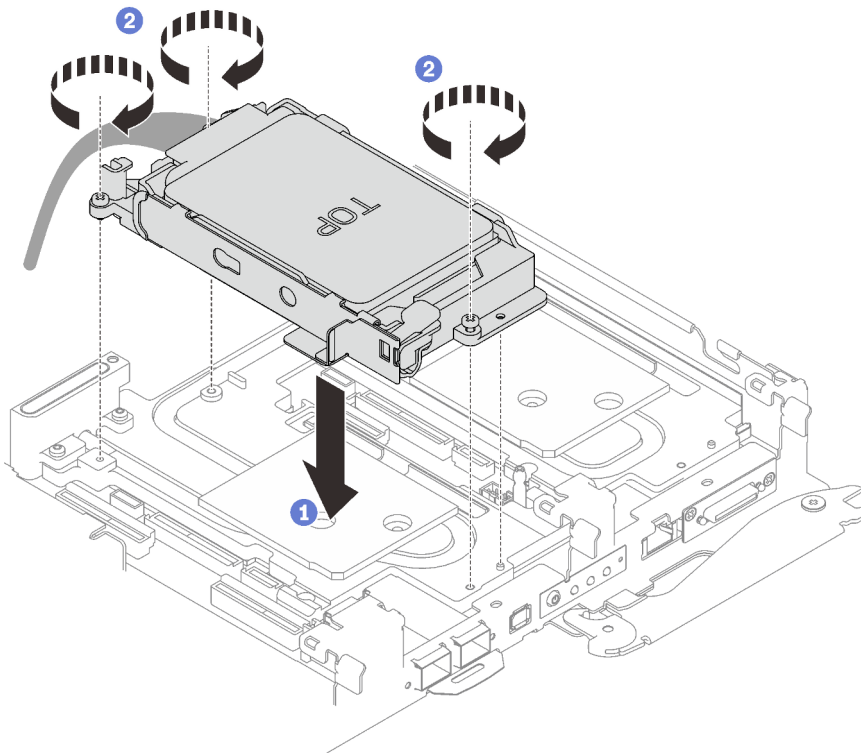


Figure 82. Two 7 mm drive cage assembly installation

Step 5. Connect the drive assembly cable to the system board and route the cable as the following illustration.

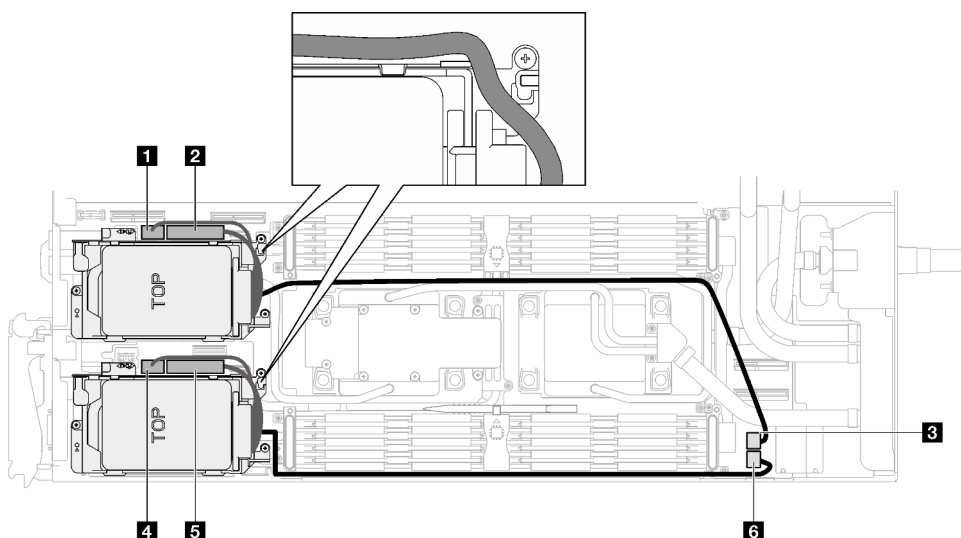


Figure 83. Drive assembly cable routing

1 SATA 0-1 connector
2 NVMe 0-1 connector
3 Drive power 2 connector
4 SATA 2-3 connector
5 NVMe 2-3 connector
6 Drive power 1 connector

After you finish

1. Install the cross braces. See [“Install the cross braces” on page 52.](#)
2. Install the tray cover. See [“Install the tray cover” on page 49.](#)
3. Install the tray into the enclosure. See [“Install a DWC tray in the enclosure” on page 46.](#)
4. Connect all required external cables to the solution.

Note: Use extra force to connect QSFP cables to the solution.

5. Check the power LED on each node to make sure it changes from fast blink to slow blink to indicate all nodes are ready to be powered on.

Demo video

[Watch the procedure on YouTube](#)

7mm NVMe drive and drive cage assembly replacement

Use the following procedures to remove and install a 7mm NVMe drive and drive cage assembly.

Remove a 7mm NVMe drive cage assembly

Use this information to remove a 7mm NVMe drive cage assembly.

About this task

Required tools

Make sure you have the following kits at hand to properly replace the component:

- Conduction plate U3 7mm with gap pad
- U3 7mm dual putty pad
- HDD Conduction small U3

Attention:

- Read [“Installation Guidelines” on page 31](#) and [“Safety inspection checklist” on page 32](#) to ensure that you work safely.
- Turn off the corresponding DWC tray that you are going to perform the task on.
- Disconnect all external cables from the enclosure.
- Use extra force to disconnect QSFP cables if they are connected to the solution.

Procedure

Step 1. Make preparations for this task.

- Remove the tray from the enclosure. See [“Remove a DWC tray from the enclosure” on page 45](#).
- Remove the tray cover. See [“Remove the tray cover” on page 48](#).
- Remove the cross braces. See [“Remove the cross braces” on page 50](#).

Step 2. Disconnect the cables from the system board.

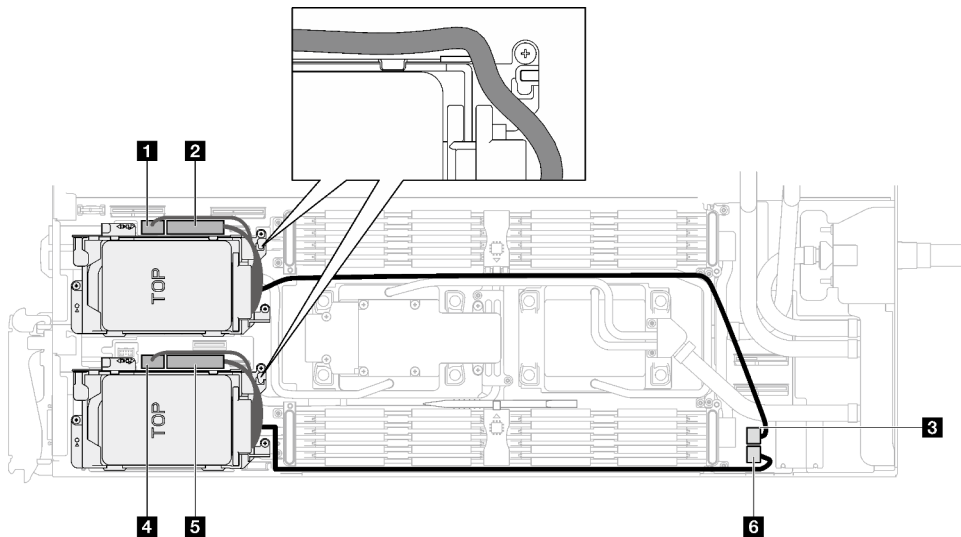


Figure 84. Drive assembly cable routing

1 SATA 0-1 connector
2 NVMe 0-1 connector
3 Drive power 2 connector
4 SATA 2-3 connector

5 NVMe 2-3 connector
6 Drive power 1 connector

Step 3. Remove the drive cage assembly.

- a. ① Remove the three screws.
- b. ② Remove the drive assembly out of the node.

Note: The following illustration might differ slightly from your hardware, but the installation method is the same.

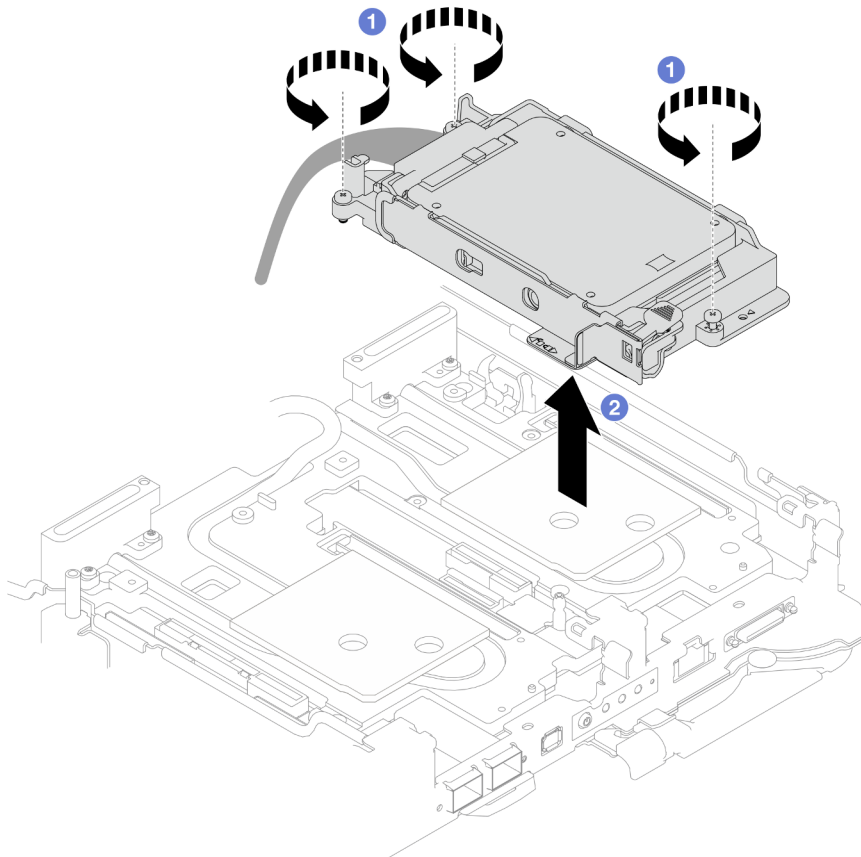


Figure 85. 7 mm NVMe drive cage assembly removal

Step 4. If necessary, remove the blank bezel fillers.

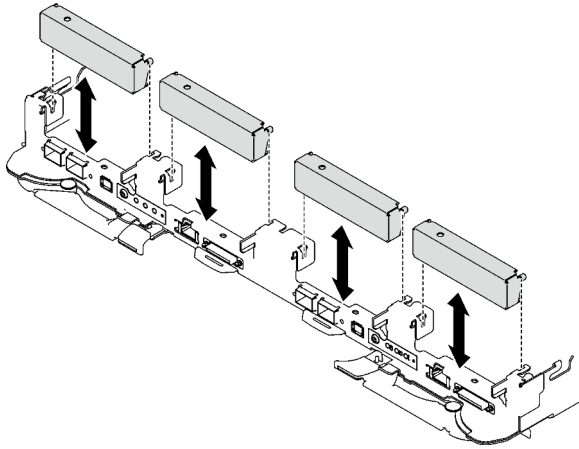


Figure 86. Blank bezel filler removal

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

[Watch the procedure on YouTube](#)

Remove a 7mm NVMe drive

Use this information to remove a 7mm NVMe drive.

About this task

Required tools

Make sure you have the following kits at hand to properly replace the component:

- Conduction plate U3 7mm with gap pad
- U3 7mm dual putty pad
- HDD Conduction small U3

Attention:

- Read [“Installation Guidelines” on page 31](#) and [“Safety inspection checklist” on page 32](#) to ensure that you work safely.
- Turn off the corresponding DWC tray that you are going to perform the task on.
- Disconnect all external cables from the enclosure.
- Use extra force to disconnect QSFP cables if they are connected to the solution.

Procedure

Step 1. Make preparations for this task.

- a. Remove the tray from the enclosure. See [“Remove a DWC tray from the enclosure” on page 45](#).
- b. Remove the tray cover. See [“Remove the tray cover” on page 48](#).

- c. Remove the cross braces. See [“Remove the cross braces” on page 50.](#)
- d. Remove the 7mm NVMe drive cage. See [“Remove a 7mm NVMe drive cage assembly” on page 100.](#)

Step 2. Remove the upper drive.

- a. ① Push and hold the release latch.
- b. ② Slide the metal tab to the unlocked position.
- c. ③ Pivot the drive out of the top of the drive cage as shown.
- d. ④ Disconnect the cable from the drive.

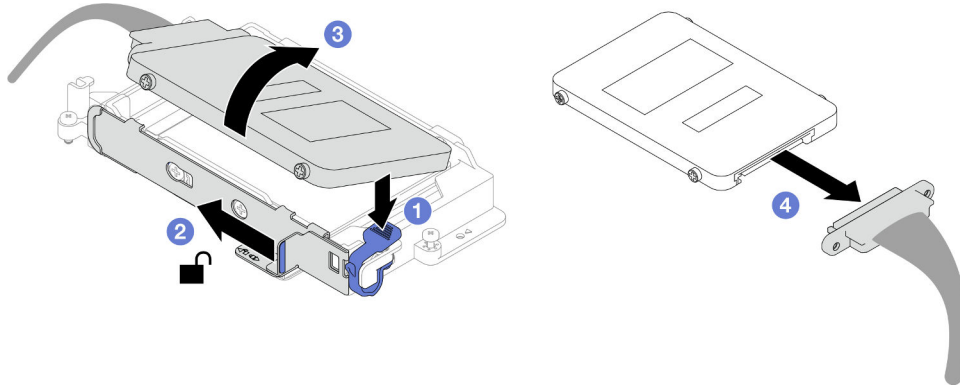


Figure 87. Upper drive removal (7mm NVMe)

Step 3. Remove the lower drive.

- a. ① Remove the drive out of the bottom of the drive cage.
- b. ② Disconnect the cable from the drive.

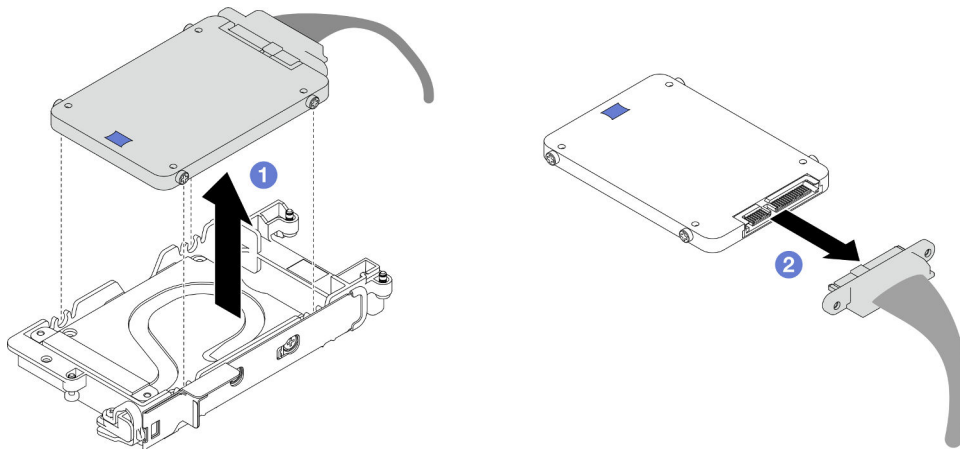


Figure 88. Lower drive removal

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

[Watch the procedure on YouTube](#)

Install a 7mm NVMe drive

Use this information to install a 7mm NVMe drive.

About this task

Required tools

Make sure you have the following kits at hand to properly replace the component:

- Conduction plate U3 7mm with gap pad
- U3 7mm dual putty pad
- HDD Conduction small U3

Attention:

- Read [“Installation Guidelines” on page 31](#) and [“Safety inspection checklist” on page 32](#) to ensure that you work safely.

Important: Gap pad/putty pad replacement guidelines

- To identify the gap pad/putty pad location and orientation, see [“Gap pad/Putty pad identification and location” on page 40](#).
- Before replacing the gap pad/putty pad, gently clean the interface plate or the hardware surface with an alcohol cleaning pad.
- Hold the gap pad/putty pad carefully to avoid deformation. Make sure no screw hole or opening is blocked by the gap pad/putty pad material.
- Do not use expired putty pad. Check the expiry date on putty pad package. If the putty pads are expired, acquire new ones to properly replace them.

Procedure

- Step 1. If the gap pad on the conduction plate is damaged or detached, discard the conduction plate. Then, install a new conduction plate already attached with the gap pad.

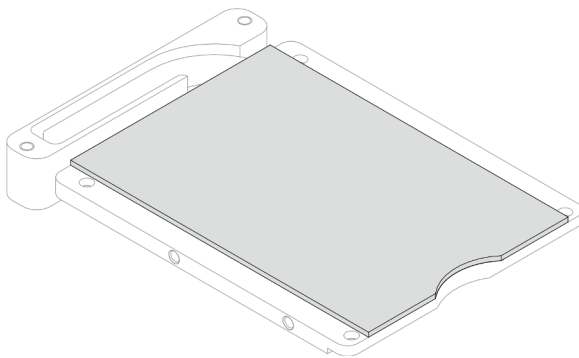


Figure 89. Conduction plate gap pad installation

- Step 2. Install the conduction plate to the drive cage.
- 1 Unlock the metal tab on the drive cage.
 - 2 Align the conduction plate to two guide pins on the drive cage; then, install the conduction plate to the drive cage as shown.

- c. ③ Install the four screws to secure the conduction plate to the drive cage.

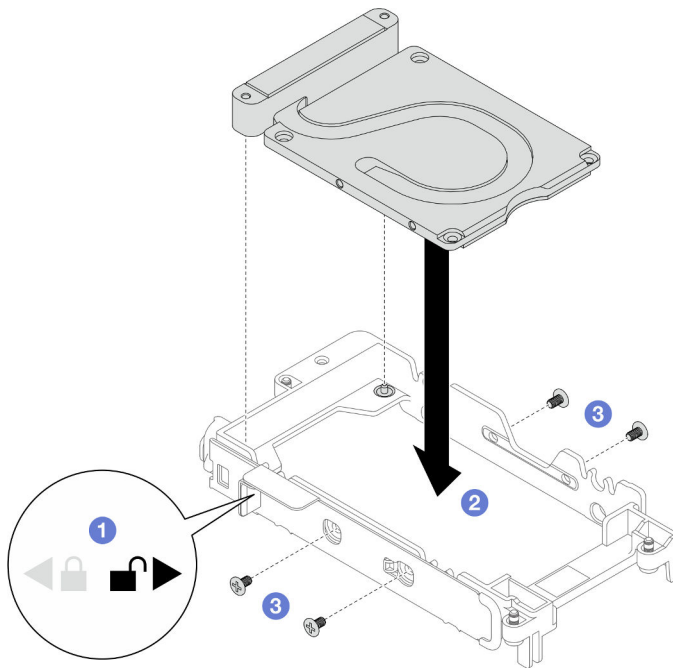


Figure 90. Conduction plate installation

Step 3. Install the lower drive.

- a. ① Connect the cable with **SSD 0/2** marked on plugger to the drive.
- b. ② Install the drive into the bottom of the drive cage and make sure it is secured in place.

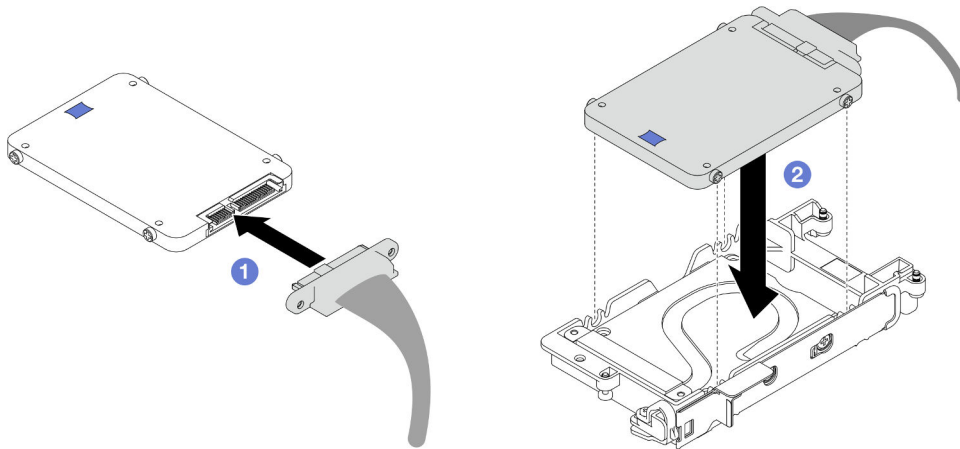


Figure 91. Lower drive installation

Step 4. Install the upper drive.

- a. ① Connect the cable with **SSD 1/3** marked on plugger to the drive. Then, insert the screws on the drive into the two screw holes on the drive cage.
- b. ② Rotate the drive into the drive cage.
- c. ③ Press the drive into the drive cage.
- d. ④ While pressing down the drive, push and hold the release latch.

- e. 5 Slide the metal tab to the lock position.

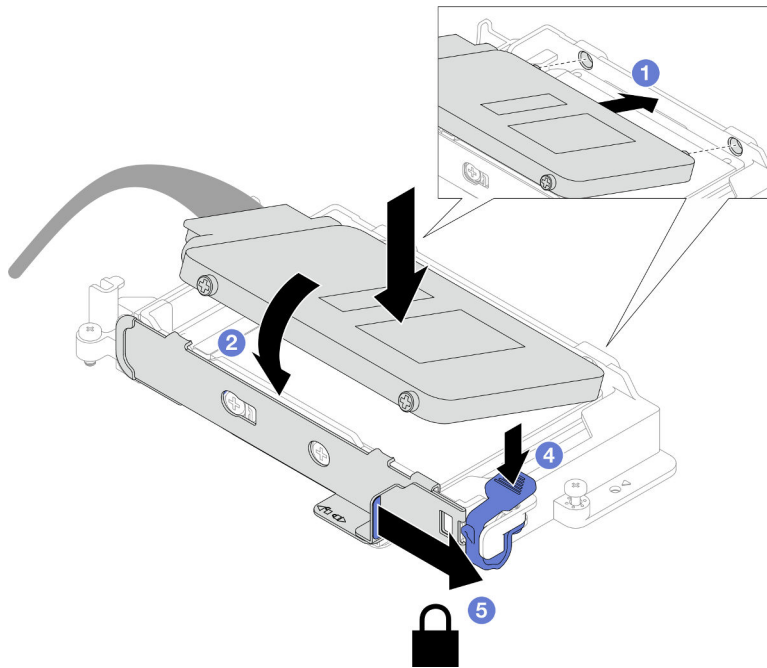
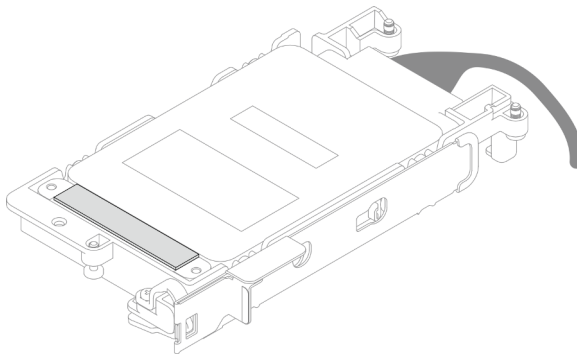


Figure 92. Upper drive installation

- Step 5. Replace the putty pad on the conduction plate. Make sure to follow [Gap pad/putty pad replacement guidelines](#).



After you finish

1. Install the 7mm NVMe drive cage. See [“Install a 7mm NVMe drive cage assembly”](#) on page 108.
2. Install the cross braces. See [“Install the cross braces”](#) on page 52.
3. Install the tray cover. See [“Install the tray cover”](#) on page 49.
4. Install the tray into the enclosure. See [“Install a DWC tray in the enclosure”](#) on page 46.
5. Connect all required external cables to the solution.

Note: Use extra force to connect QSFP cables to the solution.

6. Check the power LED on each node to make sure it changes from fast blink to slow blink to indicate all nodes are ready to be powered on.

Demo video

[Watch the procedure on YouTube](#)

Install a 7mm NVMe drive cage assembly

Use this information to install a 7mm NVMe drive cage assembly.

About this task

Required tools

Make sure you have the following kits at hand to properly replace the component:

- Conduction plate U3 7mm with gap pad
- U3 7mm dual putty pad
- HDD Conduction small U3

Attention:

- Read [“Installation Guidelines” on page 31](#) and [“Safety inspection checklist” on page 32](#) to ensure that you work safely.
- Ensure the 7mm NVMe drives are installed correctly into the drive cage assembly. See [“Install a 7mm NVMe drive” on page 105](#).

Important: Gap pad/putty pad replacement guidelines

- To identify the gap pad/putty pad location and orientation, see [“Gap pad/Putty pad identification and location” on page 40](#).
- Before replacing the gap pad/putty pad, gently clean the interface plate or the hardware surface with an alcohol cleaning pad.
- Hold the gap pad/putty pad carefully to avoid deformation. Make sure no screw hole or opening is blocked by the gap pad/putty pad material.
- Do not use expired putty pad. Check the expiry date on putty pad package. If the putty pads are expired, acquire new ones to properly replace them.

Firmware and driver download: You might need to update the firmware or driver after replacing a component.

- Go to <https://datacentersupport.lenovo.com/products/servers/thinksystem/sd650v3/7d7m/downloads/driver-list/> to see the latest firmware and driver updates for your server.
- Go to [“Update the firmware” on page 239](#) for more information on firmware updating tools.

Procedure

Step 1. Make sure the blank bezel fillers are installed. If not, install them to the node.

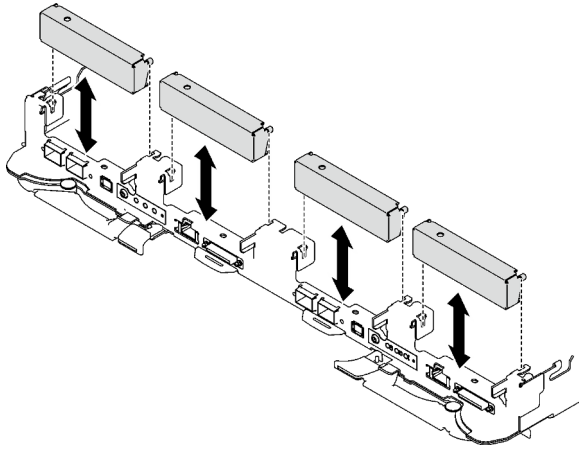


Figure 93. Blank bezel filler installation

- Step 2. If the drive cage gap pad is damaged or missing, replace it with a new one. See the following for the gap pad location for each drive cage. Make sure to follow [Gap pad/putty pad replacement guidelines](#).

Note: Align the gap pad with marking on water loop when attaching gap pad.

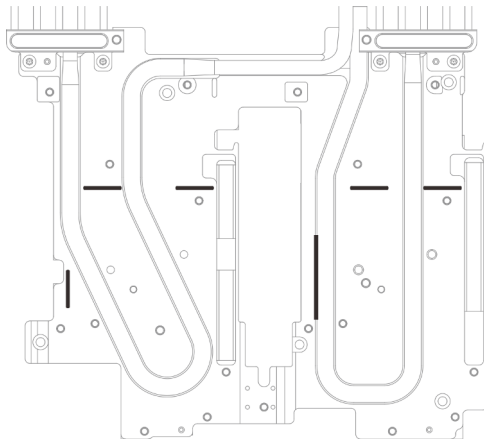


Figure 94. Markings on water loop for gap pad alignment

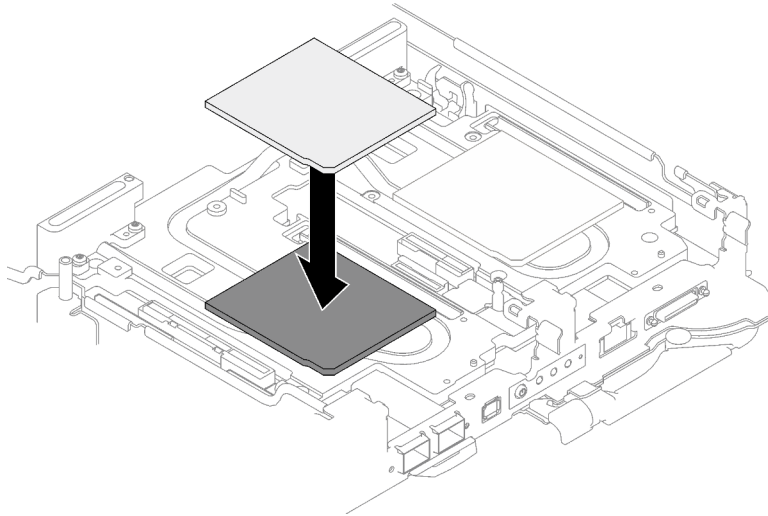


Figure 95. Replacing gap pad

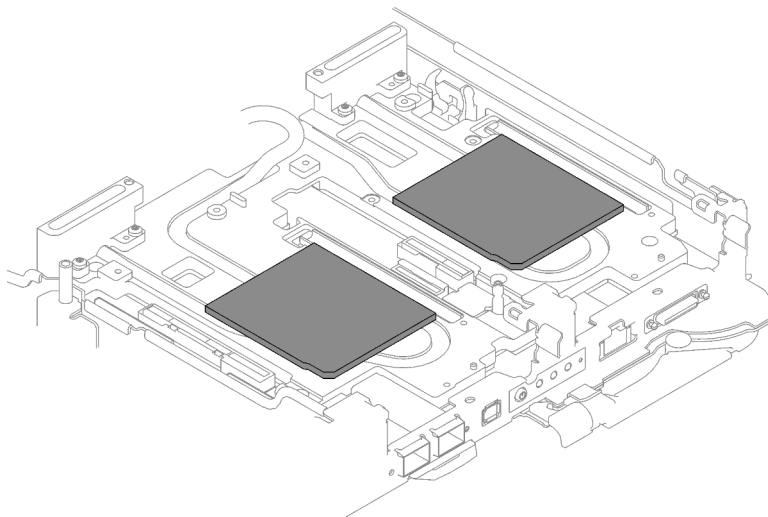


Figure 96. Gap pad locations

- Step 3. Install the drive cage assembly.
- 1 Install the drive assembly into the node.
 - 2 Secure the 3 screws.

Note: The following illustration might differ slightly from your hardware, but the installation method is the same.

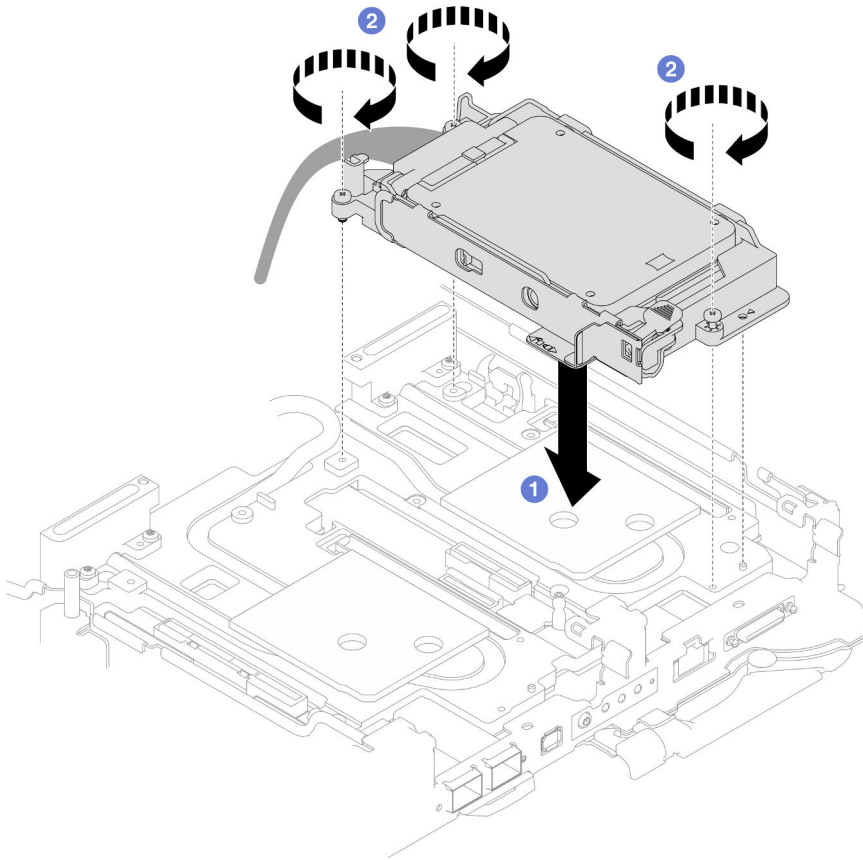


Figure 97. 7mm NVMe drive cage assembly installation

- Step 4. Connect the drive assembly cable to the system board. Cable routing is different for SATA drives and NVMe drives. Follow the cable routing below according to the drive configuration in your system. For more information, see [“System-board connectors” on page 17](#).

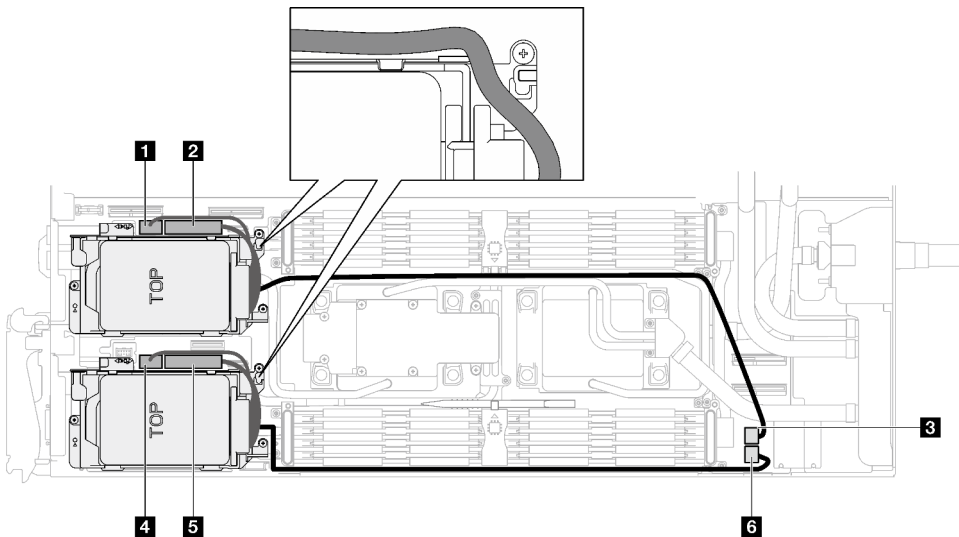


Figure 98. Drive assembly cable routing

1	SATA 0-1 connector
2	NVMe 0-1 connector
3	Drive power 2 connector
4	SATA 2-3 connector
5	NVMe 2-3 connector
6	Drive power 1 connector

After you finish

1. Install the cross braces. See [“Install the cross braces” on page 52](#).
2. Install the tray cover. See [“Install the tray cover” on page 49](#).
3. Install the tray into the enclosure. See [“Install a DWC tray in the enclosure” on page 46](#).
4. Connect all required external cables to the solution.

Note: Use extra force to connect QSFP cables to the solution.

5. Check the power LED on each node to make sure it changes from fast blink to slow blink to indicate all nodes are ready to be powered on.

Demo video

[Watch the procedure on YouTube](#)

E3.s drive and drive cage assembly replacement

Use the following procedures to remove and install an E3.s drive and drive cage assembly.

Remove the E3.S drive cage assembly

Use this information to remove the E3.S drive cage assembly.

About this task

Required tools

Make sure you have the following kits at hand to properly replace the component:

- E3S Drive Conduction plat with gap pad
- E3S Putty pad kit
- E3S gap pad kit

Attention:

- Read [“Installation Guidelines” on page 31](#) and [“Safety inspection checklist” on page 32](#) to ensure that you work safely.
- Turn off the corresponding DWC tray that you are going to perform the task on.
- Disconnect all external cables from the enclosure.
- Use extra force to disconnect QSFP cables if they are connected to the solution.

Procedure

Step 1. Make preparations for this task.

- a. Remove the tray from the enclosure. See [“Remove a DWC tray from the enclosure” on page 45.](#)
- b. Remove the tray cover. See [“Remove the tray cover” on page 48.](#)
- c. Remove the cross braces. See [“Remove the cross braces” on page 50.](#)

Step 2. Disconnect the cables from the system board.

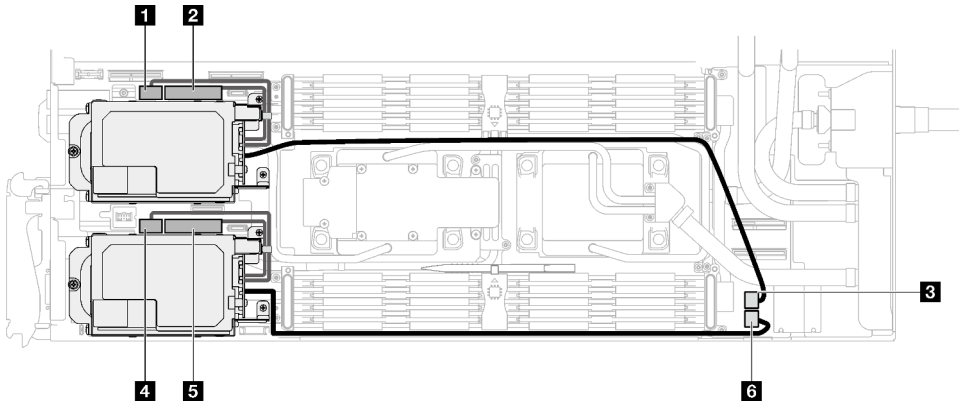


Figure 99. E3.S drive cable routing

1 SATA 0-1 connector
2 NVMe 0-1 connector
3 Drive power 2 connector
4 SATA 2-3 connector
5 NVMe 2-3 connector
6 Drive power 1 connector

Step 3. Remove the E3.S drive cage assembly.

- a. ① Remove the three screws.
- b. ② Remove the E3.S drive cage assembly out of the node.

Note: The following illustration might differ slightly from your hardware, but the installation method is the same.

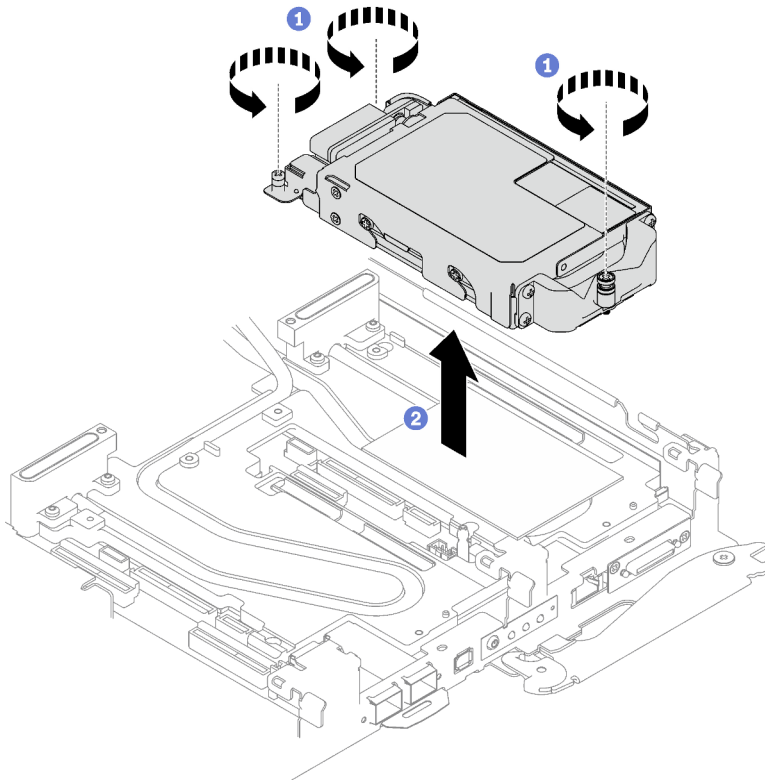


Figure 100. E3.S drive cage assembly removal

Step 4. If necessary, remove the blank bezel fillers.

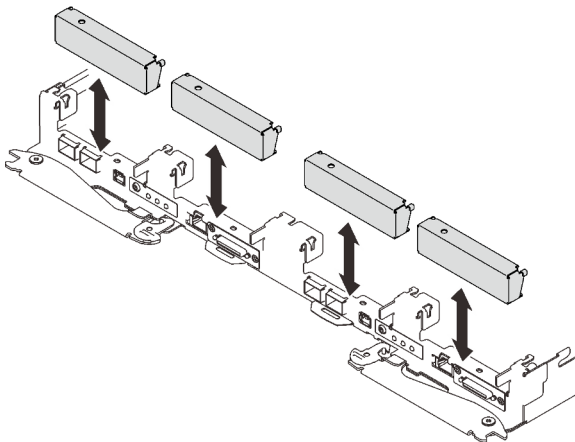


Figure 101. Blank bezel filler removal

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Remove an E3.s drive

Use this information to remove an E3.s drive.

About this task

Required tools

Make sure you have the following kits at hand to properly replace the component:

- E3S Drive Conduction plat with gap pad
- E3S Putty pad kit
- E3S gap pad kit

Attention:

- Read [“Installation Guidelines” on page 31](#) and [“Safety inspection checklist” on page 32](#) to ensure that you work safely.
- Turn off the corresponding DWC tray that you are going to perform the task on.
- Disconnect all external cables from the enclosure.
- Use extra force to disconnect QSFP cables if they are connected to the solution.

Procedure

Step 1. Make preparations for this task.

- a. Remove the tray from the enclosure. See [“Remove a DWC tray from the enclosure” on page 45](#).
- b. Remove the tray cover. See [“Remove the tray cover” on page 48](#).
- c. Remove the cross braces. See [“Remove the cross braces” on page 50](#).
- d. Remove the E3.S drive cage. See [“Remove the E3.S drive cage assembly” on page 112](#).

Step 2. The cables on the E3.S drive cable-ended backplane are bundled with the cable tie. Unfasten the cable tie to release the cables from it.

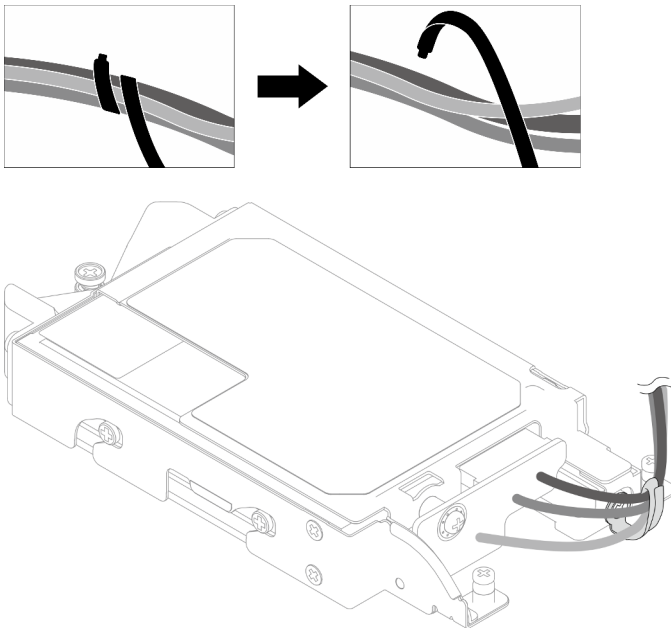


Figure 102. Release cables from the cable tie

Step 3. Remove the screw; then, remove the cable tie from the E3.S drive cage.

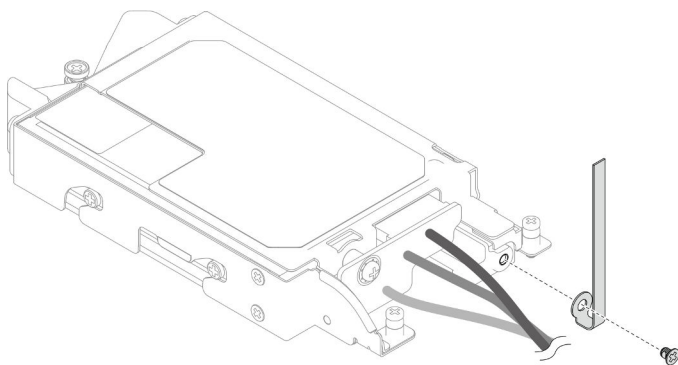


Figure 103. Cable tie removal

- Step 4. Remove the E3.S drive cable-ended backplane.
- 1 Remove the screw.
 - 2 Remove the backplane from the E3.S drive cage.

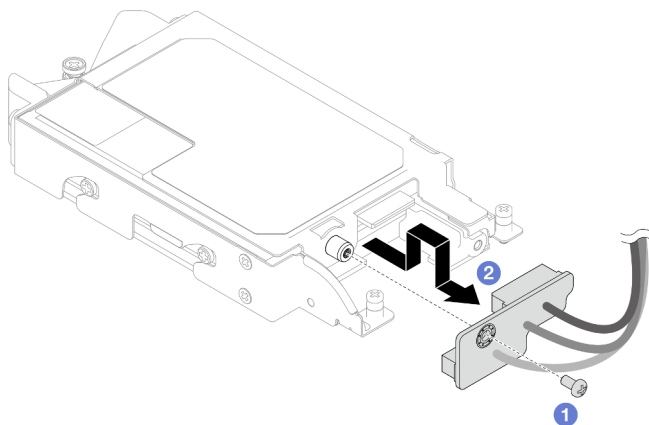


Figure 104. E3.S drive cable-ended backplane removal

- Step 5. Remove the bottom E3.S drive from the drive cage.
- 1 Remove the four screws.
 - 2 Remove the bottom E3.S drive from the E3.S drive cage.

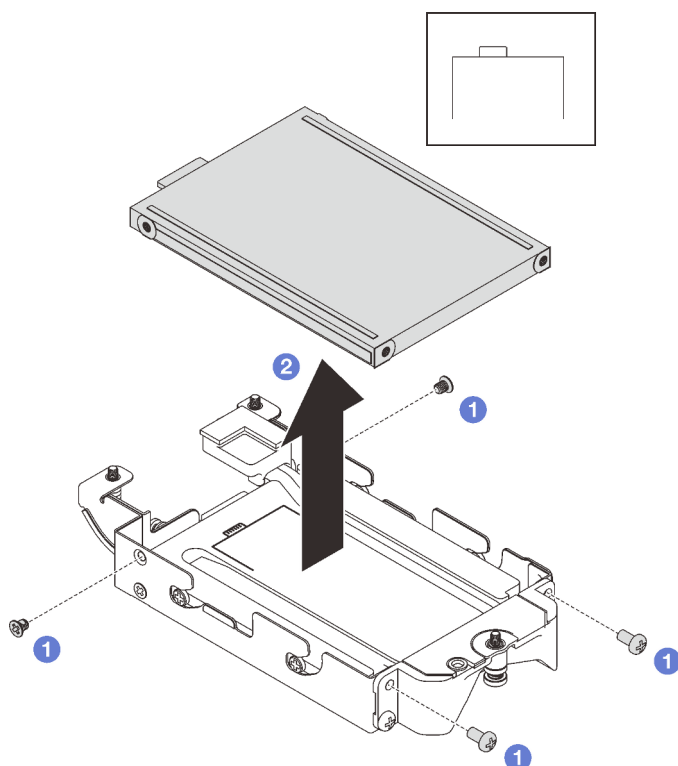


Figure 105. Bottom E3.S drive removal

Step 6. Remove the conduction plate.

- a. ① Remove the two screws.
- b. ② Insert a flat head screwdriver into the notch on the corner of the drive cage; then, slightly rotate the screwdriver to release the conduction plate from the E3.S drive cage.
- c. ③ Remove the conduction plate from the E3.S drive cage.

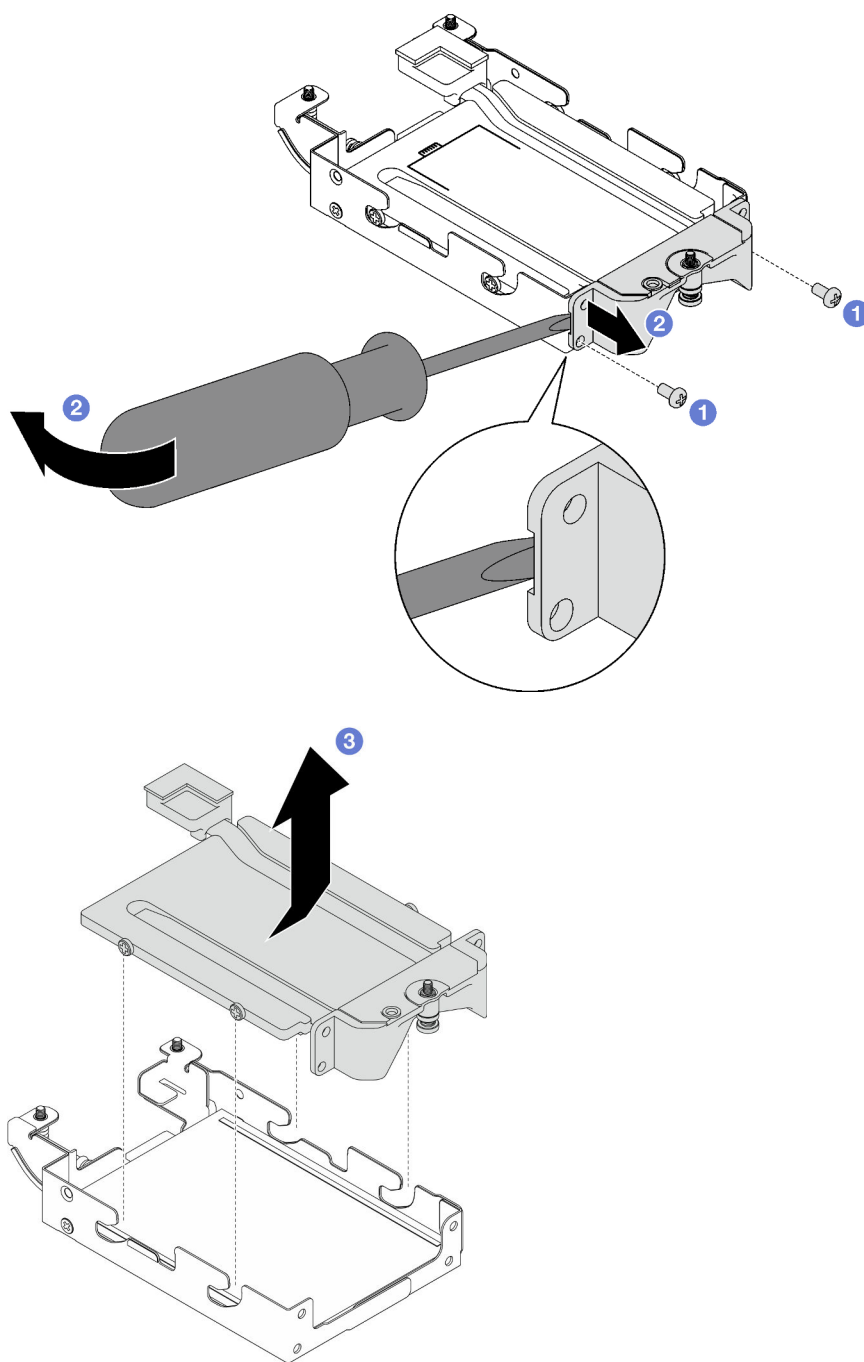


Figure 106. Conduction plate removal

- Step 7. Remove the top E3.S drive.
- a. ① Remove the two screws.
 - b. ② Remove the top E3.S drive from the drive cage.

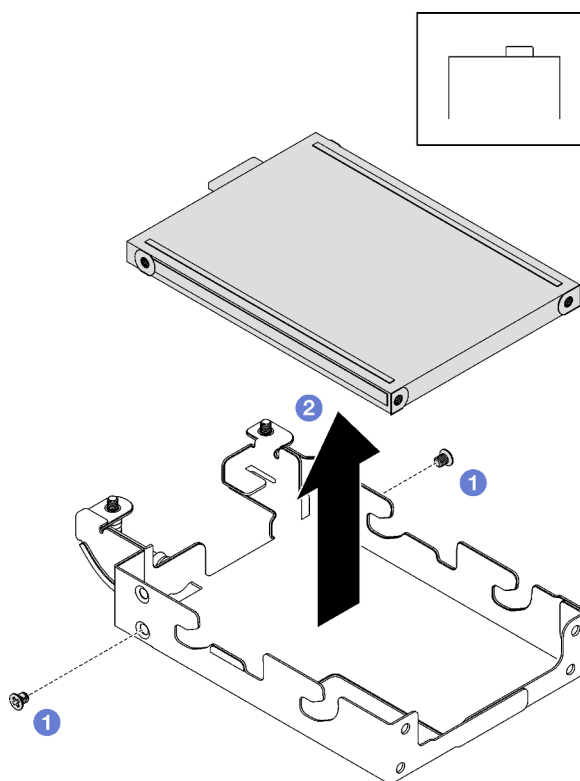


Figure 107. Top E3.S drive removal

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Install an E3.s drive

Use this information to install an E3.s drive.

About this task

Required tools

Make sure you have the following kits at hand to properly replace the component:

- E3S Drive Conduction plat with gap pad
- E3S Putty pad kit
- E3S gap pad kit

Important: Gap pad/putty pad replacement guidelines

- To identify the gap pad/putty pad location and orientation, see [“Gap pad/Putty pad identification and location” on page 40](#).
- Before replacing the gap pad/putty pad, gently clean the interface plate or the hardware surface with an alcohol cleaning pad.
- Hold the gap pad/putty pad carefully to avoid deformation. Make sure no screw hole or opening is blocked by the gap pad/putty pad material.

- Do not use expired putty pad. Check the expiry date on putty pad package. If the putty pads are expired, acquire new ones to properly replace them.

Attention:

- Read [“Installation Guidelines” on page 31](#) and [“Safety inspection checklist” on page 32](#) to ensure that you work safely.

Procedure

Step 1. Install the top E3.S drive to the E3.S drive cage.

- 1 Orient the E3.S drive so that the connector is on the right side as shown. Then, place the E3.S drive into the E3.S drive cage.
- 2 Fasten the two screws to secure the E3.S drive to the E3.S drive cage

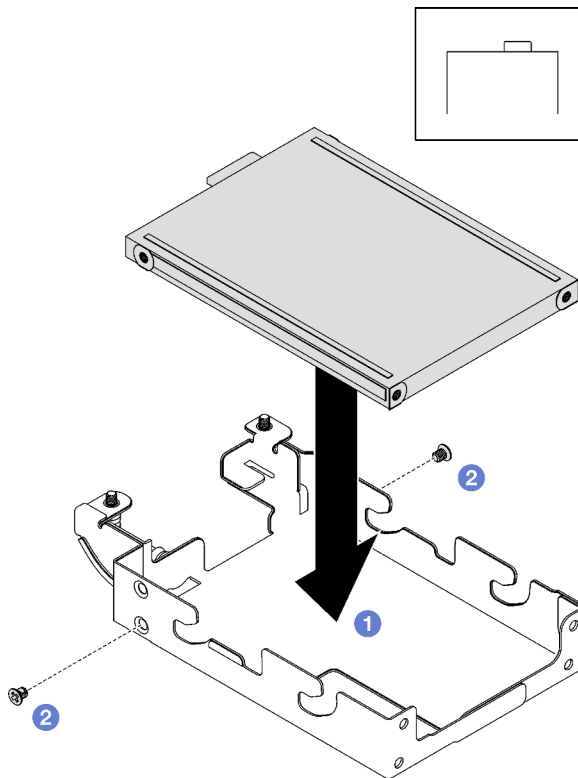


Figure 108. Top E3.S drive installation

Step 2. If the gap pad located on the conduction plate is damaged or detached, discard the conduction plate. Then, install a new conduction plate already attached with the gap pad.

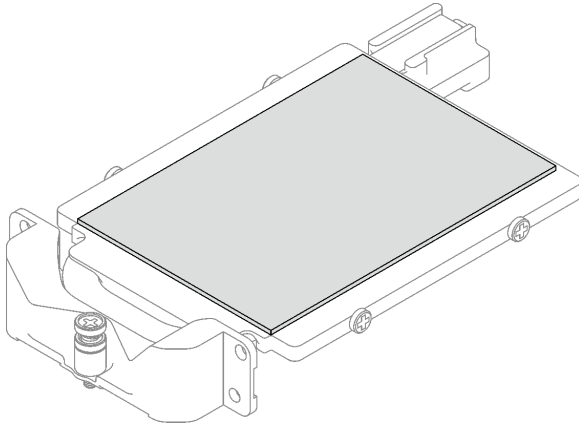


Figure 109. Replacing the conduction plate gap pad

- Step 3. If the putty pads on the reverse side of the conduction plate are damaged or detached, replace them with new ones. Make sure to follow [Gap pad/putty pad replacement guidelines](#).

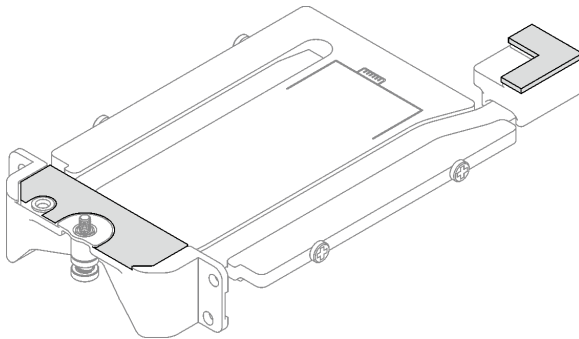


Figure 110. Replacing the conduction plate putty pads

- Step 4. Install the conduction plate to the drive cage.
- a. ① Hold the conduction plate at an angle; then, insert the conduction plate into the E3.S drive cage.
 - b. ② Fasten the two screws to secure the conduction plate to the E3.S drive cage.

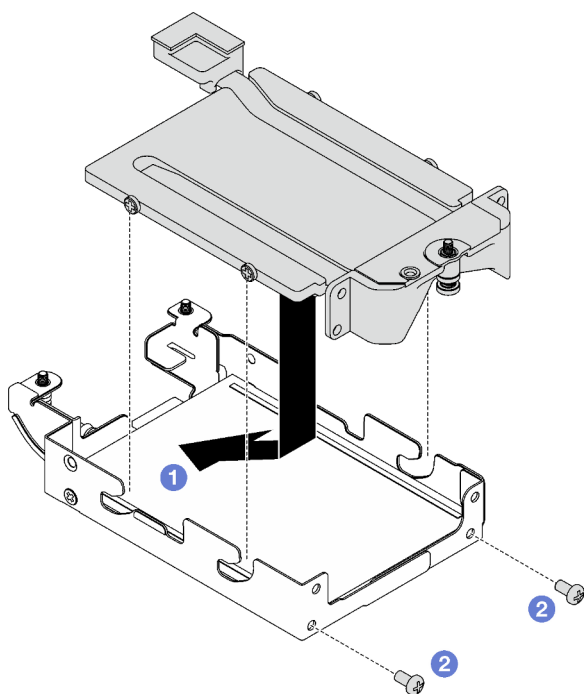


Figure 111. E3.S drive conduction plate installation

Step 5. Install the bottom E3.S drive.

- a. ① Orient the E3.S drive so that the connector is on the left side as shown. Then, place the bottom E3.S drive into the E3.S drive cage.
- b. ② Fasten the four screws to secure the bottom E3.S drive to the E3.S drive cage.

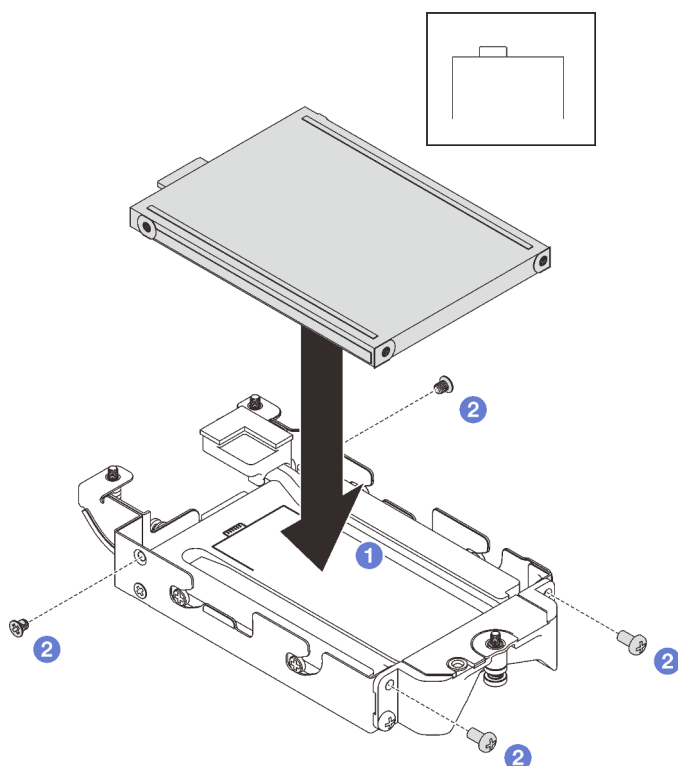


Figure 112. Bottom E3.S drive installation

Step 6. Install the E3.S drive cable-ended backplane.

- a. ① Align the backplane to the screw hole on the E3.S drive cage; then, insert the backplane to the E3.S drive cage.
- b. ② Fasten the screw to secure the backplane to the E3.S drive cage.

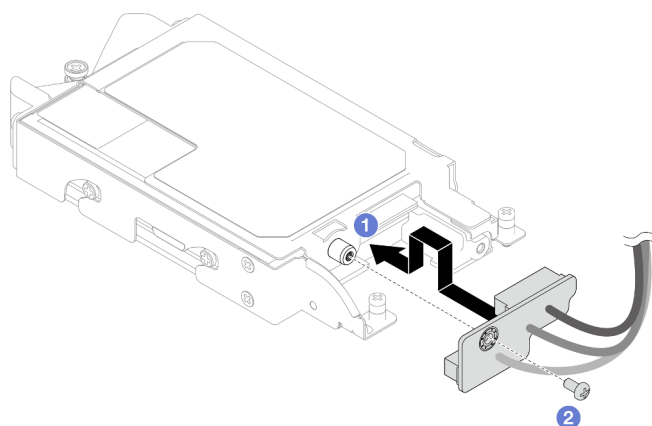


Figure 113. E3.S cable-ended backplane installation

Step 7. Fasten the screw to install the cable tie to the E3.S drive cage.

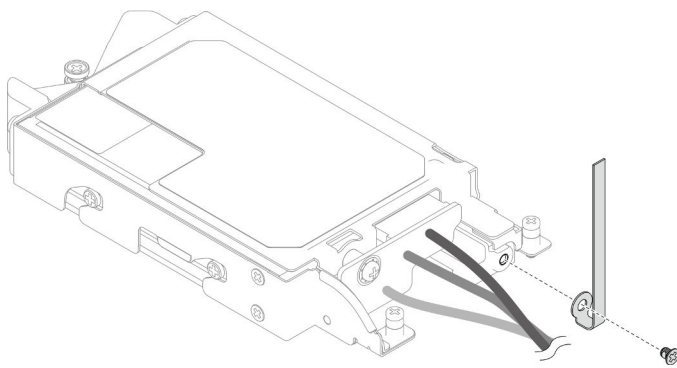


Figure 114. Cable tie installation

Step 8. Bundle the cables on the E3.S drive cable-ended backplane with the cable tie.

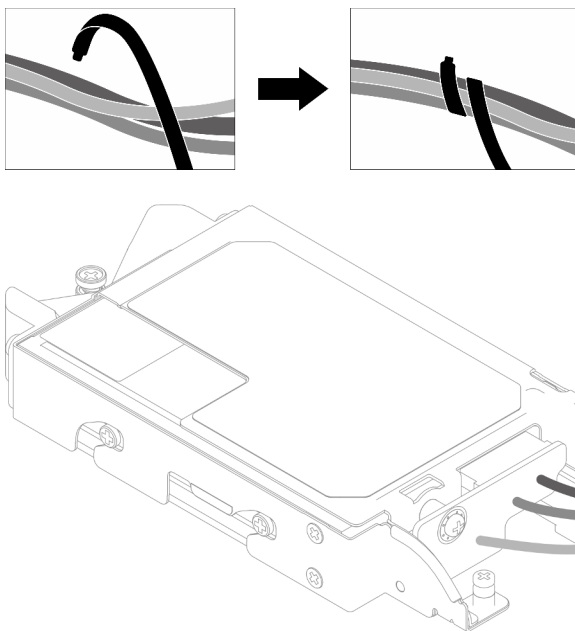


Figure 115. Bundling cables with cable tie

After you finish

1. Install the E3.S drive cage. See [“Install the E3.S drive cage assembly” on page 124](#).
2. Install the cross braces. See [“Install the cross braces” on page 52](#).
3. Install the tray cover. See [“Install the tray cover” on page 49](#).
4. Install the tray into the enclosure. See [“Install a DWC tray in the enclosure” on page 46](#).
5. Connect all required external cables to the solution.

Note: Use extra force to connect QSFP cables to the solution.

6. Check the power LED on each node to make sure it changes from fast blink to slow blink to indicate all nodes are ready to be powered on.

Install the E3.S drive cage assembly

Use this information to install the E3.S drive cage assembly.

About this task

Required tools

Make sure you have the following kits at hand to properly replace the component:

- E3S Drive Conduction plat with gap pad
- E3S Putty pad kit
- E3S gap pad kit

Important: Gap pad/putty pad replacement guidelines

- To identify the gap pad/putty pad location and orientation, see [“Gap pad/Putty pad identification and location” on page 40](#).
- Before replacing the gap pad/putty pad, gently clean the interface plate or the hardware surface with an alcohol cleaning pad.
- Hold the gap pad/putty pad carefully to avoid deformation. Make sure no screw hole or opening is blocked by the gap pad/putty pad material.
- Do not use expired putty pad. Check the expiry date on putty pad package. If the putty pads are expired, acquire new ones to properly replace them.

Attention:

- Read [“Installation Guidelines” on page 31](#) and [“Safety inspection checklist” on page 32](#) to ensure that you work safely.
- Ensure the drives are installed correctly into the drive cage assembly. See [“Install a drive” on page 92](#).

Procedure

Step 1. Make sure the blank bezel fillers are installed. If not, install them to the node.

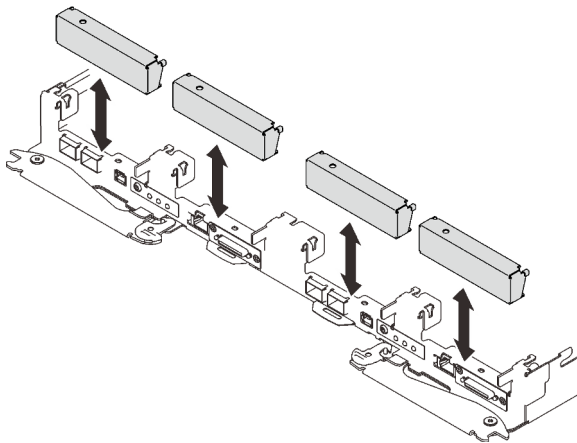


Figure 116. Blank bezel filler installation

Step 2. If the E3.S drive cage gap pad is damaged or missing, replace it with a new one. Make sure to follow [Gap pad/putty pad replacement guidelines](#).

Note: Align the gap pad with marking on water loop when attaching gap pad.

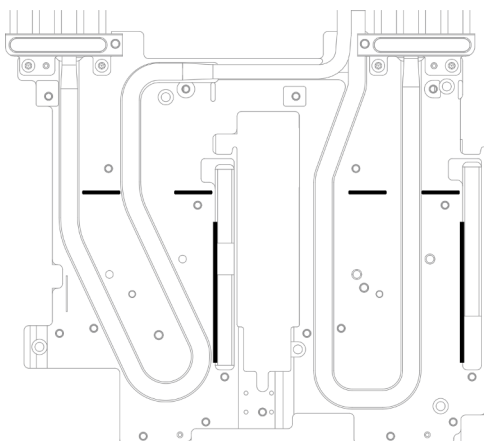


Figure 117. Markings on water loop for E3.S gap pad alignment

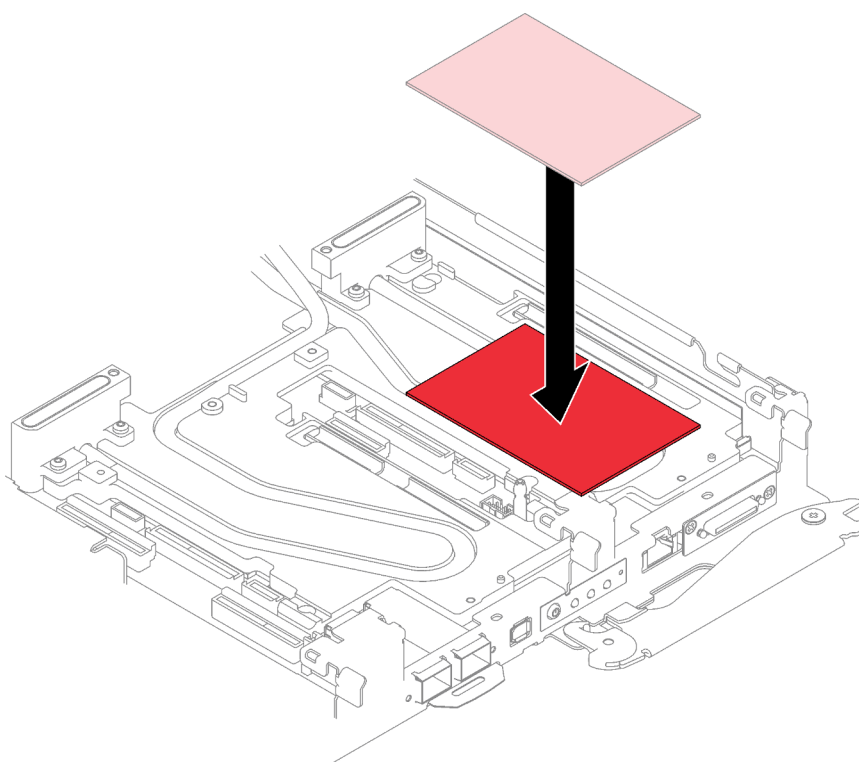


Figure 118. Replacing gap pad

Step 3. Install the E3.S drive cage assembly.

- a. ① Install the E3.S drive cage assembly into the node.
- b. ② Secure the three screws.

Note: The following illustration might differ slightly from your hardware, but the installation method is the same.

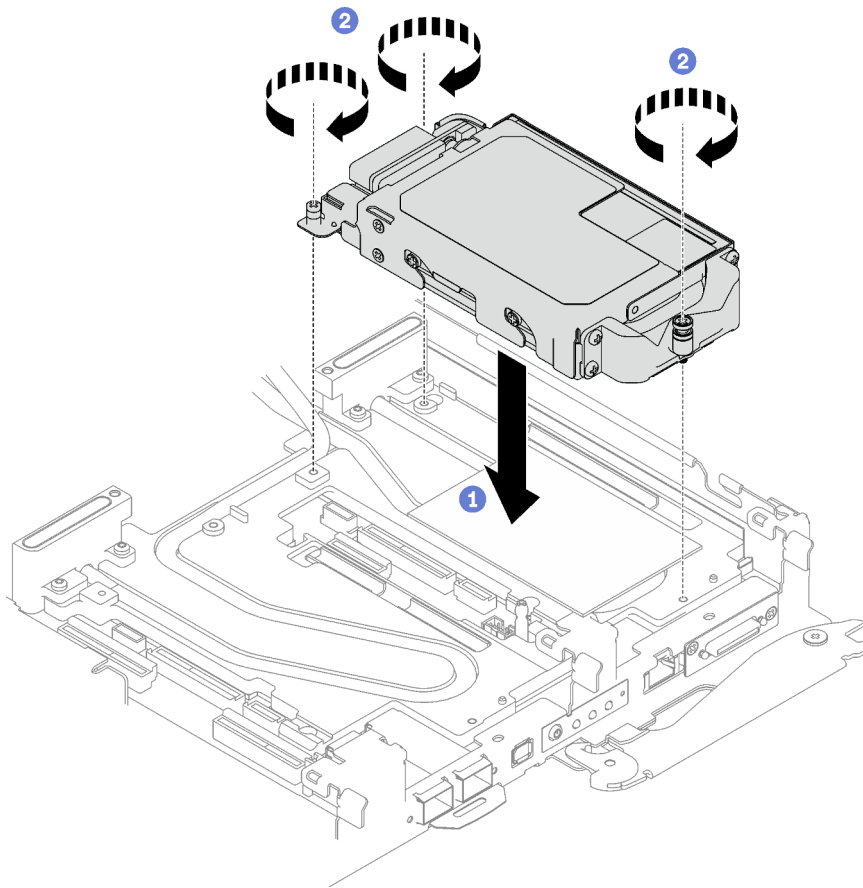


Figure 119. E3.S drive cage assembly installation

Step 4. Connect the drive assembly cable to the system board and route the cable as the following illustration. For more information, see [“System-board connectors” on page 17](#).

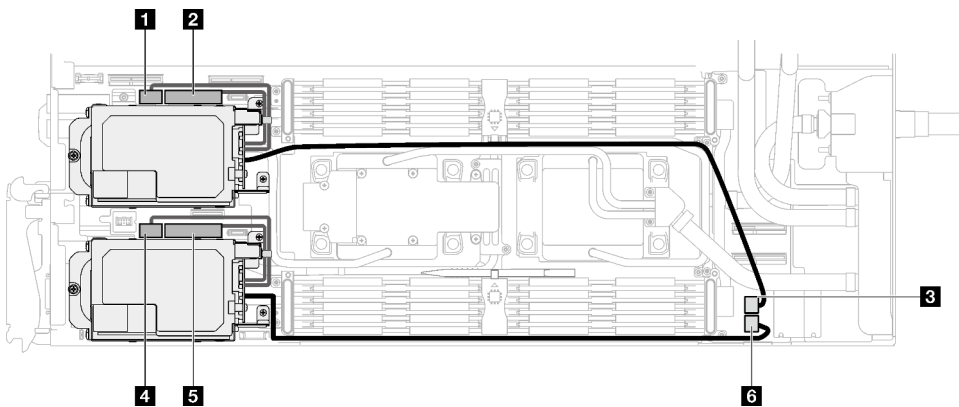


Figure 120. E3.S drive cable routing

1 SATA 0-1 connector

2 NVMe 0-1 connector

3 Drive power 2 connector

4 SATA 2-3 connector

5 NVMe 2-3 connector
6 Drive power 1 connector

After you finish

1. Install the cross braces. See [“Install the cross braces” on page 52](#).
2. Install the tray cover. See [“Install the tray cover” on page 49](#).
3. Install the tray into the enclosure. See [“Install a DWC tray in the enclosure” on page 46](#).
4. Connect all required external cables to the solution.

Note: Use extra force to connect QSFP cables to the solution.

5. Check the power LED on each node to make sure it changes from fast blink to slow blink to indicate all nodes are ready to be powered on.

KVM cover replacement

Use the following procedures to remove and install a KVM cover.

Remove a KVM cover

Use this information to remove a KVM cover.

About this task

Attention:

- Read [“Installation Guidelines” on page 31](#) and [“Safety inspection checklist” on page 32](#) to ensure that you work safely.
- Turn off the corresponding DWC tray that you are going to perform the task on.
- Disconnect all external cables from the enclosure.
- Use extra force to disconnect QSFP cables if they are connected to the solution.

Procedure

Step 1. Make preparations for this task.

- a. Remove the tray from the enclosure. See [“Remove a DWC tray from the enclosure” on page 45](#).
- b. Remove the tray cover. See [“Remove the tray cover” on page 48](#).

Step 2. Disconnect the KVM cable from the tray.

Step 3. Remove the screws that secure the KVM cover to the tray; then, remove the KVM cover.

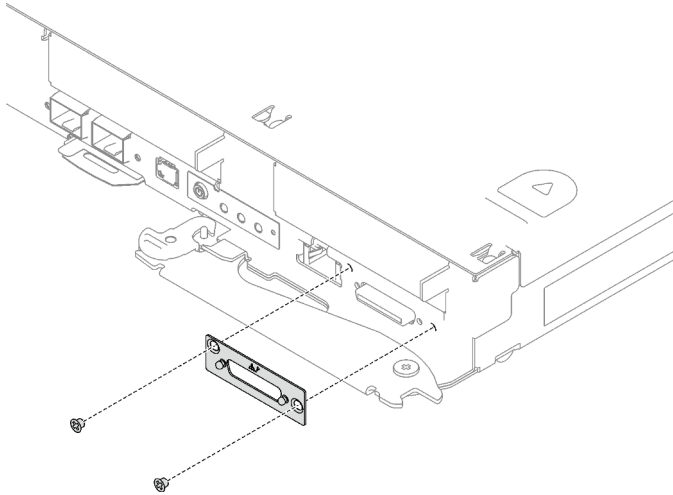


Figure 121. Removing the KVM cover

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

[Watch the procedure on YouTube](#)

Install a KVM cover

Use this information to install a KVM cover.

About this task

Attention:

- Read [“Installation Guidelines” on page 31](#) and [“Safety inspection checklist” on page 32](#) to ensure that you work safely.

Procedure

Step 1. Install the KVM cover to the tray, and secure it with two screws.

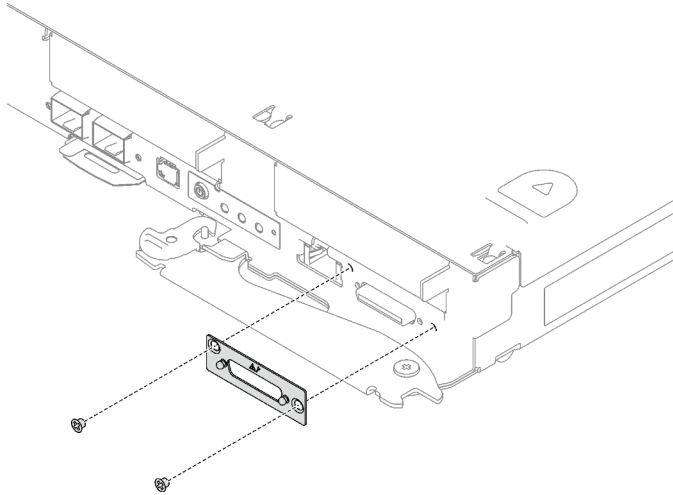


Figure 122. Installing a KVM cover

Step 2. If needed, reconnect the KVM cable.

After you finish

1. Install the tray cover. See [“Install the tray cover” on page 49](#).
2. Install the tray into the enclosure. See [“Install a DWC tray in the enclosure” on page 46](#).
3. Connect all required external cables to the solution.

Note: Use extra force to connect QSFP cables to the solution.

4. Check the power LED on each node to make sure it changes from fast blink to slow blink to indicate all nodes are ready to be powered on.

Demo video

[Watch the procedure on YouTube](#)

M.2 backplane assembly replacement

Use the following procedures to remove and install the M.2 backplane assembly.

Remove the M.2 backplane assembly

Use this information to remove the M.2 backplane assembly.

About this task

Required tools

Make sure you have the following kits at hand to properly replace the component:

- Miscellaneous parts kit
- Conduction plate parts (only damaged parts need to be replaced)
- M.2 Putty pad kit

Attention:

- Read [“Installation Guidelines” on page 31](#) and [“Safety inspection checklist” on page 32](#) to ensure that you work safely.
- Turn off the corresponding DWC tray that you are going to perform the task on.
- Disconnect all external cables from the enclosure.
- Use extra force to disconnect QSFP cables if they are connected to the solution.

Procedure

Step 1. Make preparations for this task.

- a. Remove the tray from the enclosure. See [“Remove a DWC tray from the enclosure” on page 45](#).
- b. Remove the tray cover. See [“Remove the tray cover” on page 48](#).
- c. Remove the cross braces. See [“Remove the cross braces” on page 50](#).

Step 2. Disconnect the cable from the system board.

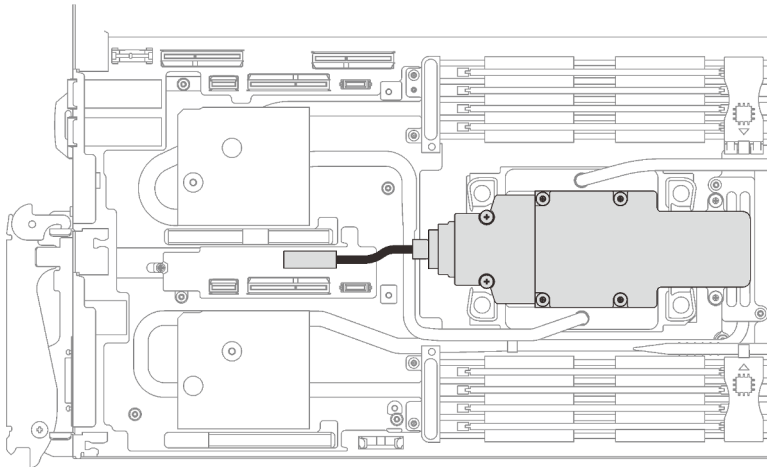


Figure 123. M.2 backplane assembly cable removal

Step 3. Remove the M.2 backplane assembly.

- a. ① Remove the six screws.
- b. ② Remove the M.2 backplane assembly out from the node.
- c. ③ Disconnect the cable from the M.2 backplane assembly.

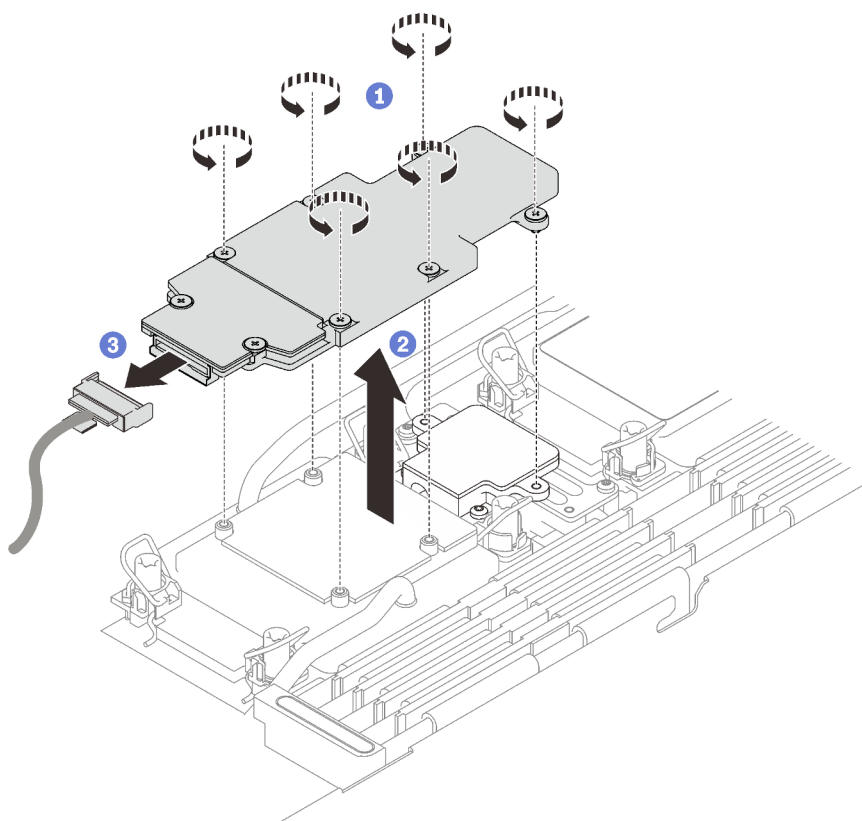


Figure 124. M.2 backplane assembly removal

- Step 4. **(Optional)** If you are removing the water loop, remove the M.2 backplane cold plate.
- 1 Unfasten the two screws.
 - 2 Remove the M.2 backplane cold plate from the processor cold plate.

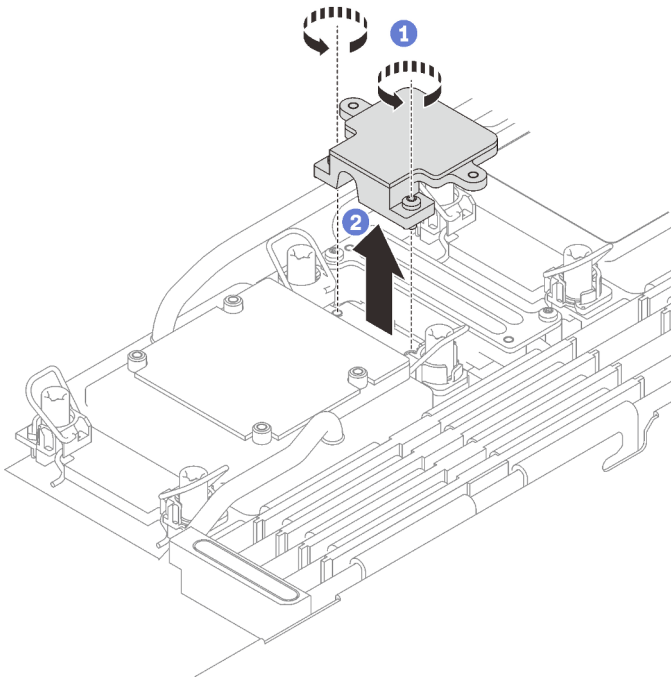


Figure 125. Removing the M.2 backplane cold plate removal

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

If you need to disassemble the M.2 backplane assembly for recycle, follow the instructions below:

Attention: You can only disassemble the M.2 backplane assembly for recycle. Do not disassemble it for any other purposes.

Make sure the M.2 drive is removed from the M.2 backplane. To remove the M.2 drive, see [“Remove an M.2 drive” on page 138](#).

1. ① Loosen the two screws.
2. ② Carefully lift the M.2 board out of the M.2 bracket.

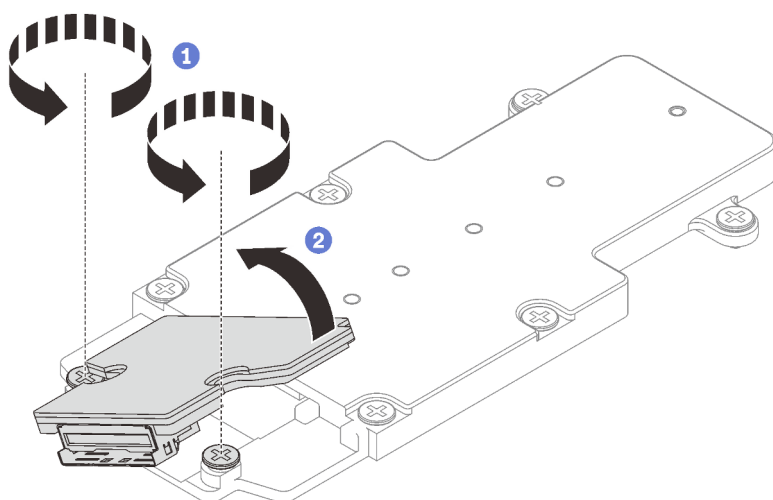


Figure 126. Disassembling M.2 backplane assembly

3. Recycle the unit in compliance with local regulations.

Demo video

[Watch the procedure on YouTube](#)

Install the M.2 backplane assembly

Use this information to install the M.2 backplane assembly.

About this task

Required tools

Make sure you have the following kits at hand to properly replace the component:

- Miscellaneous parts kit
- Conduction plate parts (only damaged parts need to be replaced)
- M.2 Putty pad kit

Important: Gap pad/putty pad replacement guidelines

- To identify the gap pad/putty pad location and orientation, see [“Gap pad/Putty pad identification and location” on page 40](#).
- Before replacing the gap pad/putty pad, gently clean the interface plate or the hardware surface with an alcohol cleaning pad.
- Hold the gap pad/putty pad carefully to avoid deformation. Make sure no screw hole or opening is blocked by the gap pad/putty pad material.
- Do not use expired putty pad. Check the expiry date on putty pad package. If the putty pads are expired, acquire new ones to properly replace them.

Attention:

- Read [“Installation Guidelines” on page 31](#) and [“Safety inspection checklist” on page 32](#) to ensure that you work safely.
- Turn off the corresponding DWC tray that you are going to perform the task on.

Firmware and driver download: You might need to update the firmware or driver after replacing a component.

- Go to <https://datacentersupport.lenovo.com/products/servers/thinksystem/sd650v3/7d7m/downloads/driver-list/> to see the latest firmware and driver updates for your server.
- Go to “Update the firmware” on page 239 for more information on firmware updating tools.

Procedure

Step 1. Replace the putty pad on the processor (Processor 1) cold plate with a new one. Make sure to follow [Gap pad/putty pad replacement guidelines](#).

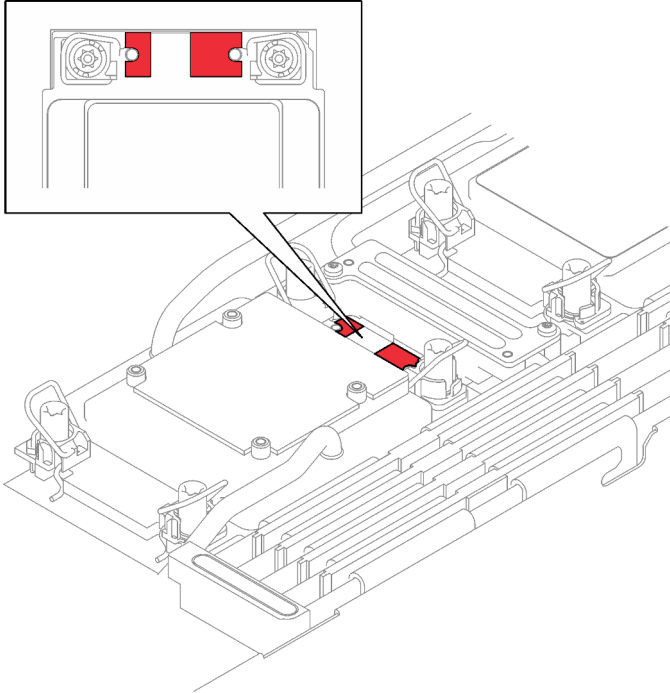
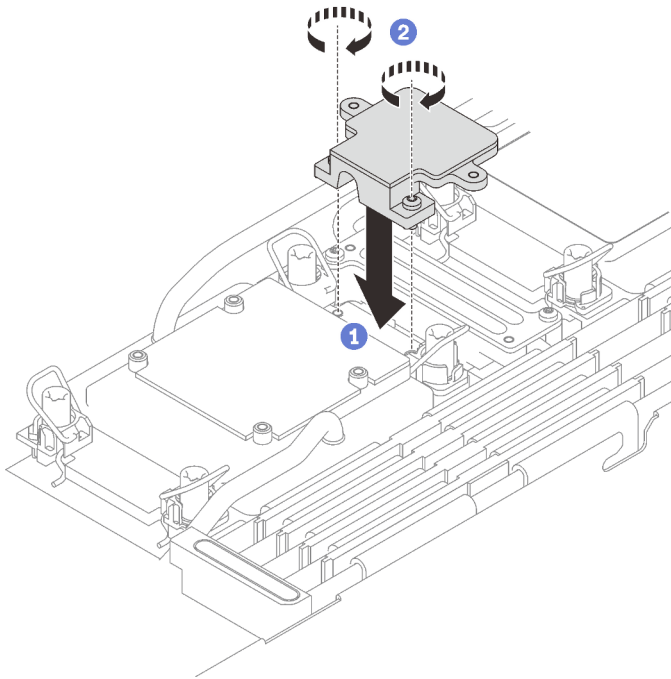


Figure 127. Gap pad on processor cold plate

Step 2. Install the M.2 backplane cold plate.

- 1 Place the M.2 cold plate onto the front processor (Processor 1) cold plate.
- 2 Fasten the two screws to secure the M.2 backplane cold plate to the processor cold plate.



Step 3. Replace the putty pad on the processor (Processor 1) cold plate and the M.2 backplane cold plate with a new ones. Make sure to follow [Gap pad/putty pad replacement guidelines](#).

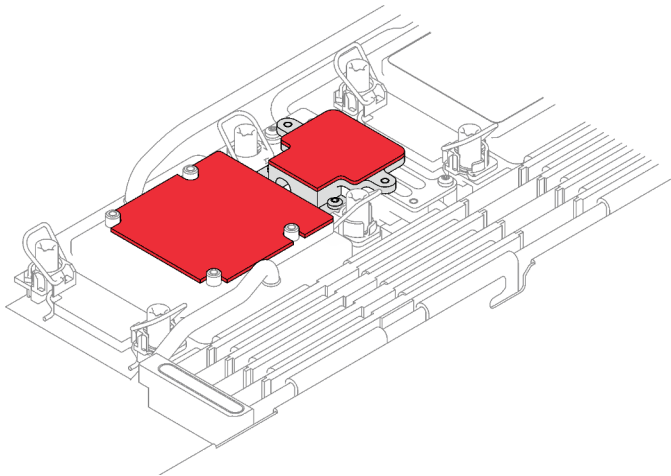


Figure 128. Gap pad on processor cold plate and M.2 backplane cold plate

Step 4. Install the M.2 backplane assembly.

- a. ① Connect the cable to the M.2 backplane assembly.
- b. ② Install the M.2 backplane assembly into the node.
- c. ③ Secure the six screws.

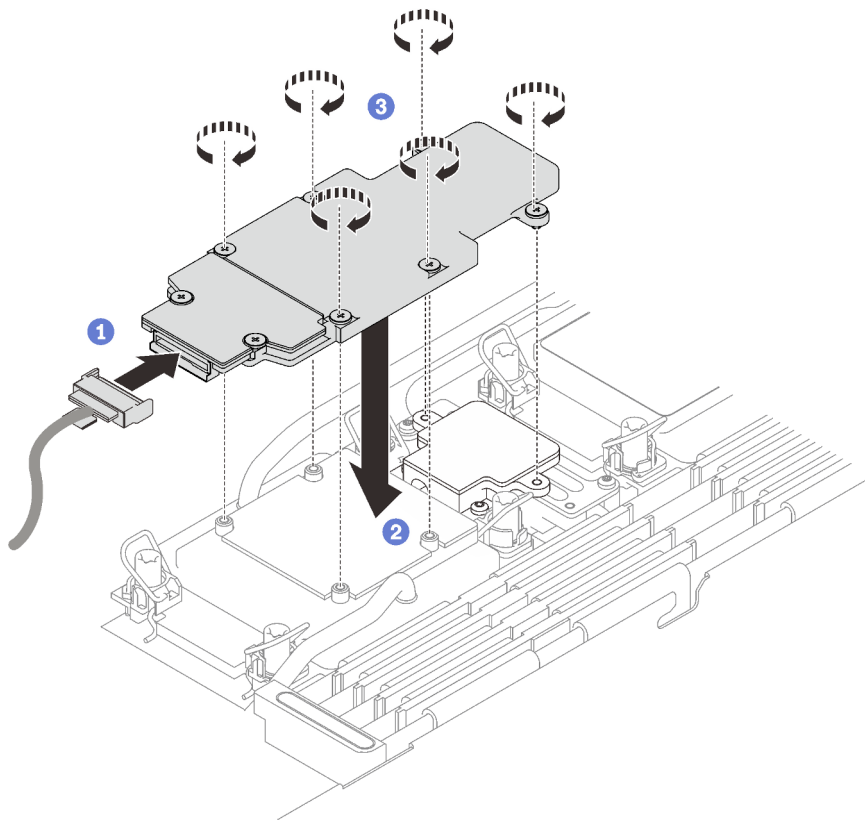


Figure 129. M.2 backplane assembly installation

Step 5. Connect the cable to the system board.

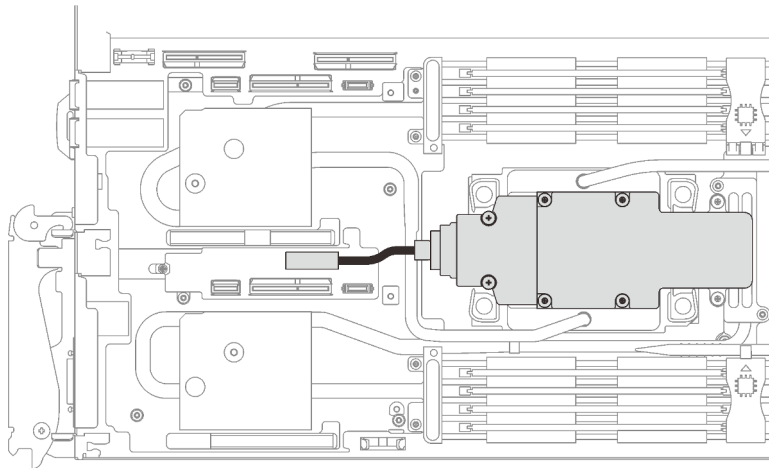


Figure 130. M.2 backplane assembly cable installation

After you finish

1. Install the cross braces. See [“Install the cross braces” on page 52](#).
2. Install the tray cover. See [“Install the tray cover” on page 49](#).
3. Install the tray into the enclosure. See [“Install a DWC tray in the enclosure” on page 46](#).
4. Connect all required external cables to the solution.

Note: Use extra force to connect QSFP cables to the solution.

5. Check the power LED on each node to make sure it changes from fast blink to slow blink to indicate all nodes are ready to be powered on.

Demo video

[Watch the procedure on YouTube](#)

M.2 drive replacement

Use the following procedures to remove and install M.2 drives.

Remove an M.2 drive

Use this information to remove an M.2 drive.

About this task

Required tools

Make sure you have the following kits at hand to properly replace the component:

- Miscellaneous parts kit
- Conduction plate parts (only damaged parts need to be replaced)
- M.2 Putty pad kit

Attention:

- Read [“Installation Guidelines” on page 31](#) and [“Safety inspection checklist” on page 32](#) to ensure that you work safely.
- Turn off the corresponding DWC tray that you are going to perform the task on.
- Disconnect all external cables from the enclosure.
- Use extra force to disconnect QSFP cables if they are connected to the solution.

Procedure

Step 1. Make preparations for this task.

- a. Remove the tray from the enclosure. See [“Remove a DWC tray from the enclosure” on page 45](#).
- b. Remove the tray cover. See [“Remove the tray cover” on page 48](#).
- c. Remove the cross braces. See [“Remove the cross braces” on page 50](#).
- d. Remove the M.2 backplane assembly. See [“Remove the M.2 backplane assembly” on page 130](#).

Step 2. Remove the M.2 drive.

- a. ❶ Remove the screw securing the M.2 drive.
- b. ❷ Rotate the M.2 drive away from the M.2 backplane assembly at an angle (approximately 30 degrees).
- c. ❸ Pull the M.2 drive away from the connector on the M.2 backplane assembly.

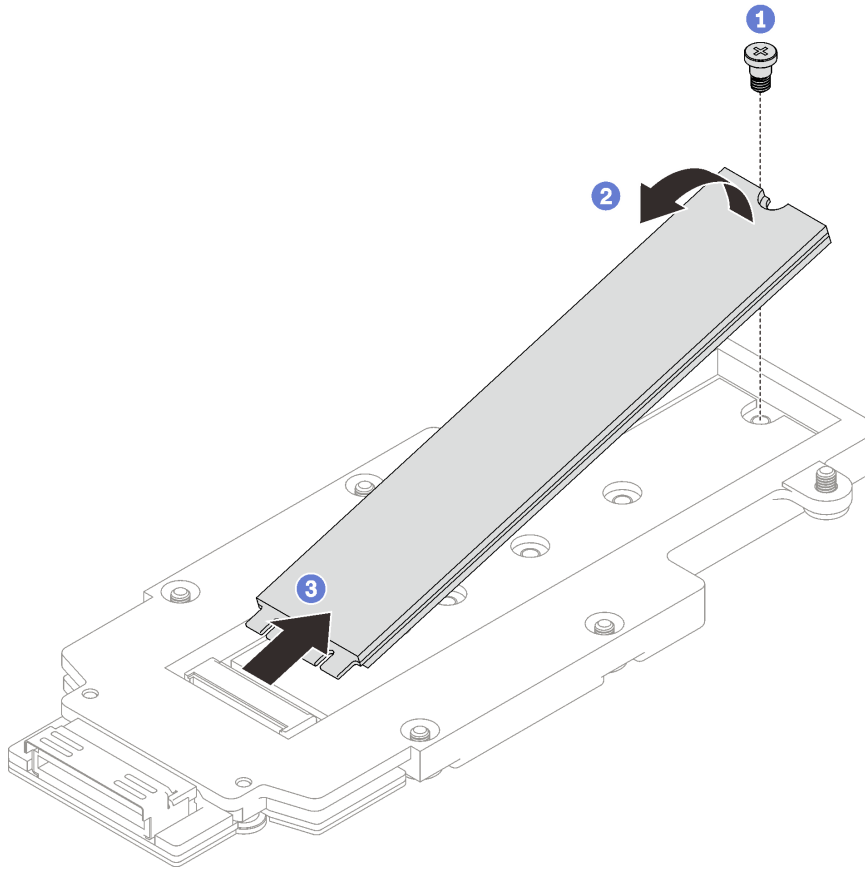


Figure 131. M.2 drive removal

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

[Watch the procedure on YouTube](#)

Install an M.2 drive

Use this information to install an M.2 drive.

About this task

Required tools

Make sure you have the following kits at hand to properly replace the component:

- Miscellaneous parts kit
- Conduction plate parts (only damaged parts need to be replaced)
- M.2 Putty pad kit

Important: Gap pad/putty pad replacement guidelines

- To identify the gap pad/putty pad location and orientation, see [“Gap pad/Putty pad identification and location” on page 40](#).
- Before replacing the gap pad/putty pad, gently clean the interface plate or the hardware surface with an alcohol cleaning pad.
- Hold the gap pad/putty pad carefully to avoid deformation. Make sure no screw hole or opening is blocked by the gap pad/putty pad material.
- Do not use expired putty pad. Check the expiry date on putty pad package. If the putty pads are expired, acquire new ones to properly replace them.

Attention:

- Read [“Installation Guidelines” on page 31](#) and [“Safety inspection checklist” on page 32](#) to ensure that you work safely.

Procedure

- Step 1. Replace the M.2 backplane putty pad with a new one. Make sure to follow [Gap pad/putty pad replacement guidelines](#).

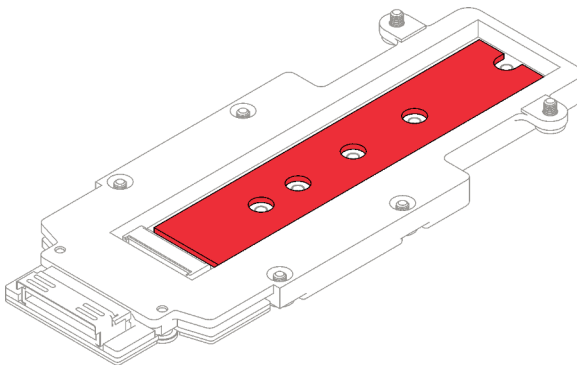


Figure 132. M.2 backplane putty pad

- Step 2. Install the M.2 drive.
- ① Insert the M.2 drive at an angle (approximately 30 degrees) into the connector on the M.2 backplane assembly.
 - ② Rotate the M.2 drive into the M.2 backplane assembly.
 - ③ Secure the M.2 drive with one screw into the corresponding hole.

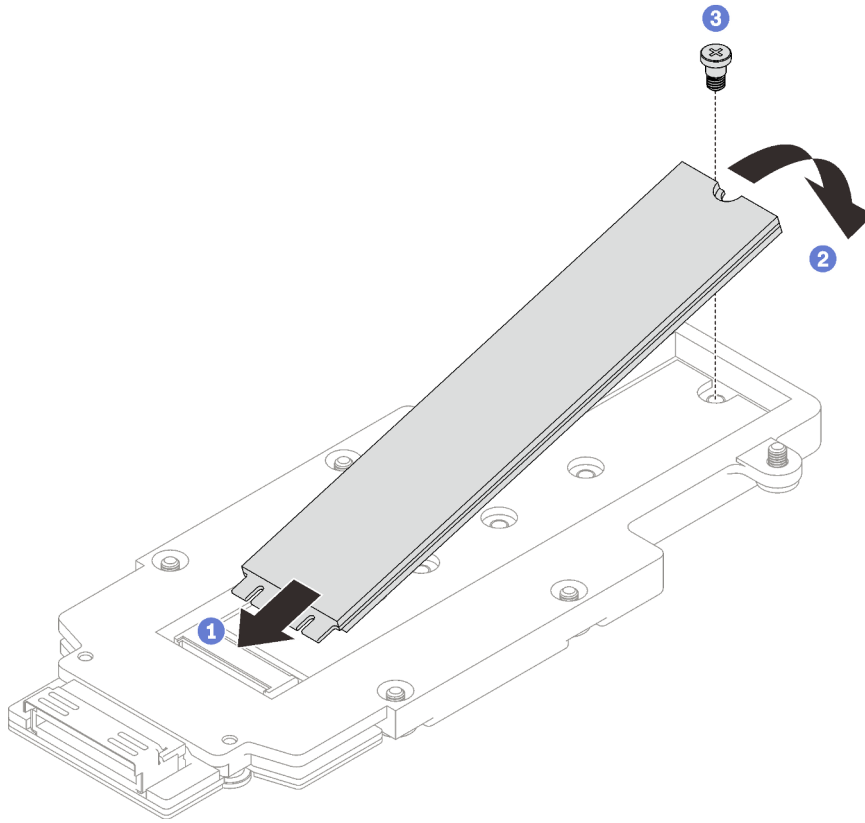


Figure 133. M.2 drive installation

After you finish

1. Install the M.2 backplane assembly. See [“Install the M.2 backplane assembly” on page 134.](#)
2. Install the cross braces. See [“Install the cross braces” on page 52.](#)
3. Install the tray cover. See [“Install the tray cover” on page 49.](#)
4. Install the tray into the enclosure. See [“Install a DWC tray in the enclosure” on page 46.](#)
5. Connect all required external cables to the solution.

Note: Use extra force to connect QSFP cables to the solution.

6. Check the power LED on each node to make sure it changes from fast blink to slow blink to indicate all nodes are ready to be powered on.

Demo video

[Watch the procedure on YouTube](#)

Memory module replacement

Use the following procedures to remove and install a memory module.

Remove a memory module

Use this information to remove a memory module.

About this task

Attention:

- Read [“Installation Guidelines” on page 31](#) and [“Safety inspection checklist” on page 32](#) to ensure that you work safely.
- Turn off the corresponding DWC tray that you are going to perform the task on.
- Disconnect the power cords and all external cables from the enclosure.
- Disconnect the power cords from the enclosure.
- Make sure to remove or install memory module 20 seconds after disconnecting power cords from the system. It allows the system to be completely discharged of electricity and safe for handling memory module.
- Use extra force to disconnect QSFP cables if they are connected to the solution.
- Memory modules are sensitive to static discharge and require special handling. In addition to the standard guidelines for [“Handling static-sensitive devices” on page 34](#):
 - Always wear an electrostatic-discharge strap when removing or installing memory modules. Electrostatic-discharge gloves can also be used.
 - Never hold two or more memory modules together so that they touch. Do not stack memory modules directly on top of each other during storage.
 - Never touch the gold memory module connector contacts or allow these contacts to touch the outside of the memory-module connector housing.
 - Handle memory modules with care: never bend, twist, or drop a memory module.
- Before installing 24 Gb DRAM RDIMMs to a system with 4th Gen Intel Xeon processors (codenamed Sapphire Rapids), make sure to update the UEFI firmware to the latest version first, then remove all existing 16 Gb DRAM RDIMMs.

The following illustration shows the location of the memory module connectors on the system board.

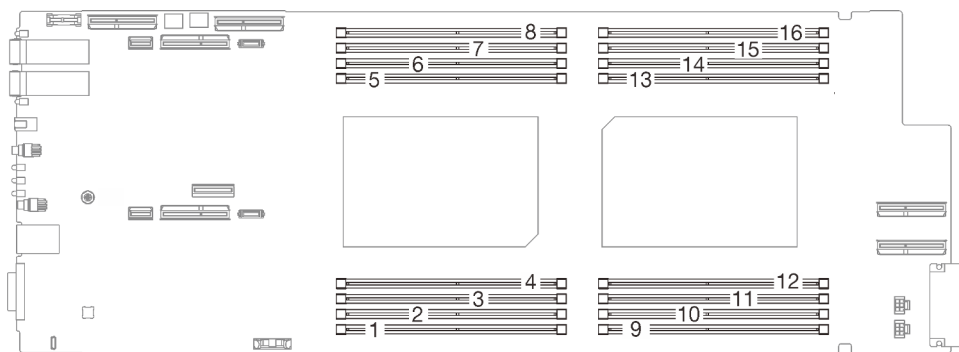


Figure 134. Memory module connector location

Note: The following illustration might differ slightly from your hardware, but the installation method is the same.

Procedure

Attention: Make sure to remove or install memory module 20 seconds after disconnecting power cords from the system. It allows the system to be completely discharged of electricity and safe for handling memory module.

Step 1. Make preparations for this task.

- a. Remove the tray from the enclosure. See [“Remove a DWC tray from the enclosure” on page 45](#).

- b. Remove the tray cover. See [“Remove the tray cover” on page 48.](#)
- Step 2. Remove the memory module tool attached to the DIMM comb.

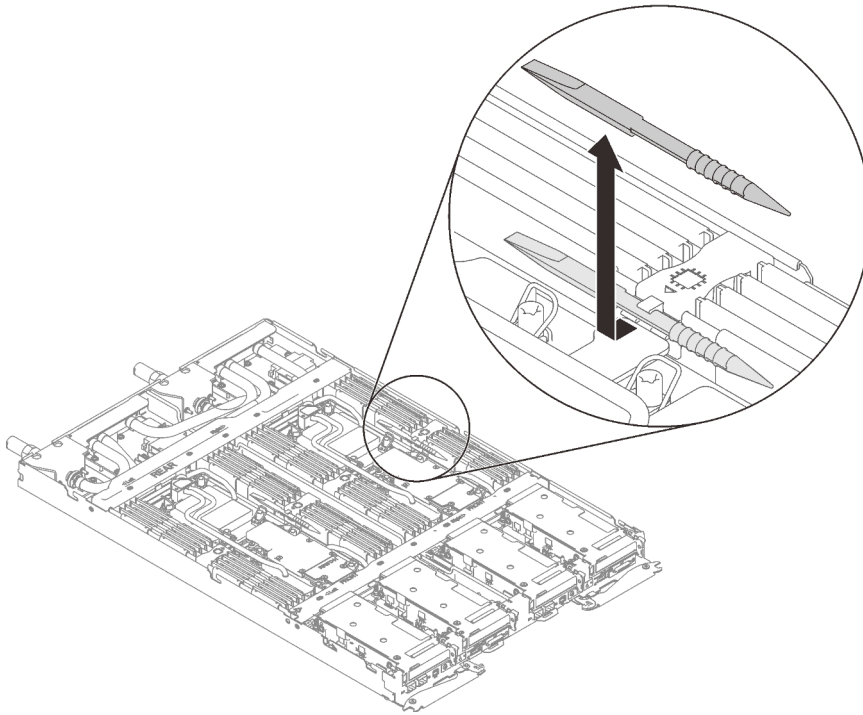


Figure 135. Memory module tool removal

Note: Memory module tool is recommended due to space limitations caused by location of water loop tubes through the memory section.

- Step 3. Unlock the retaining clips on each end of the memory module connector with the memory module tool.
- a. ① Place the tip of the tool on the top of the retaining clip.
 - b. ② Press the tool to rotate and unlock the retaining clip.

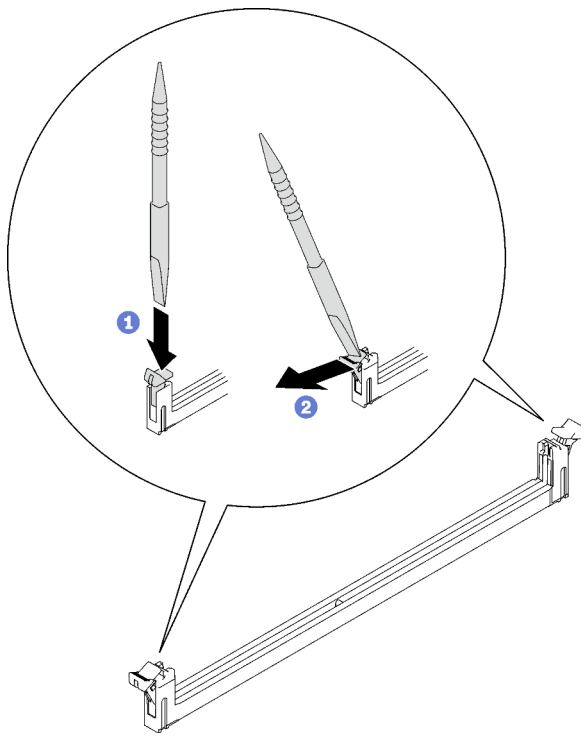


Figure 136. Pressing retaining clips on memory module connector

Attention:

- Memory modules are static-sensitive devices. The package must be grounded before it is opened.
- To avoid breaking the retaining clips or damaging the memory module connectors, open and close the clips gently.

Step 4. Hold the right end and left end of the memory module at the same time. Keep the memory module in parallel with the connector; then, carefully remove the memory module.

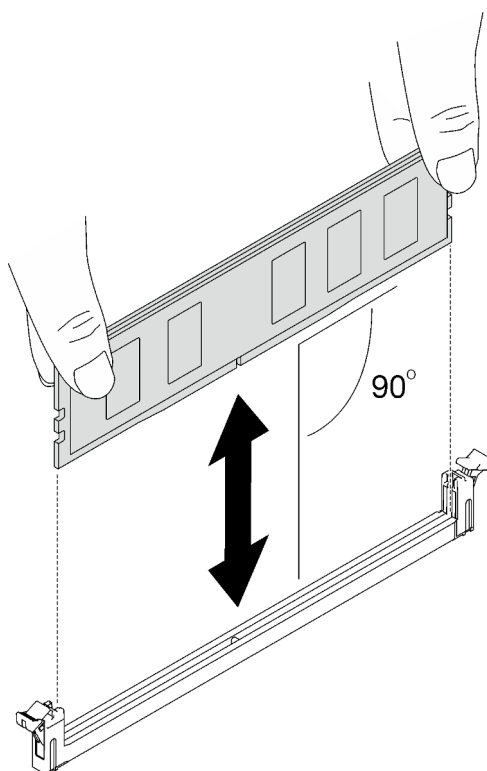
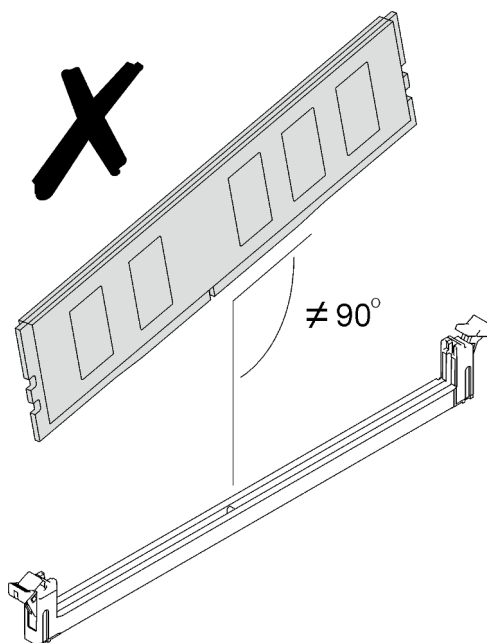


Figure 137. Memory module removal

Note: Memory module should be in horizontal position during removal.



Step 5. Install the memory module tool to the DIMM comb.

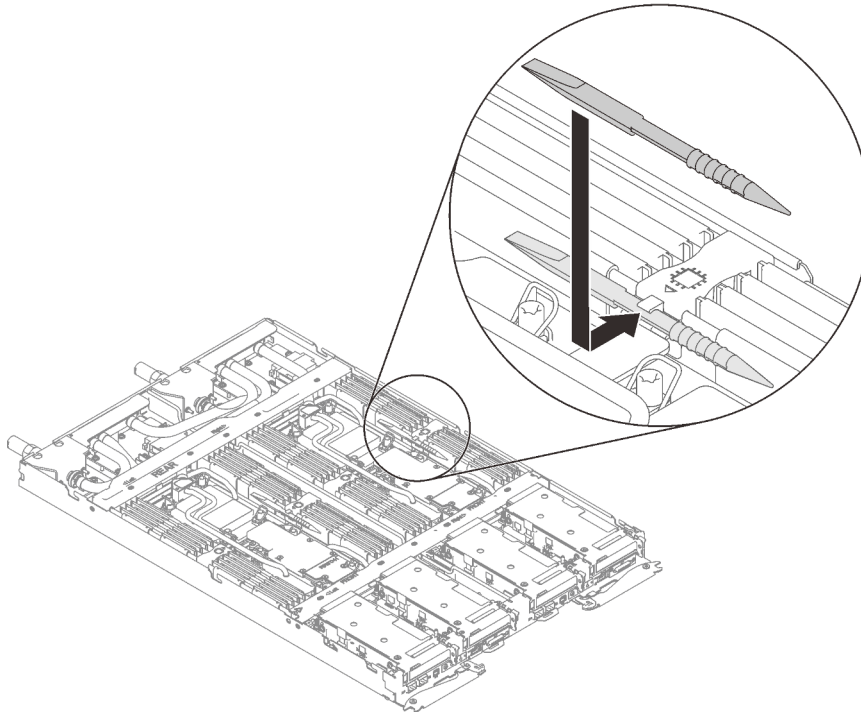


Figure 138. Memory module tool installation

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

[Watch the procedure on YouTube](#)

Install a memory module

Use this information to install a memory module.

About this task

See [“Memory module installation rules and order” on page 34](#) for detailed information about memory configuration and setup.

Attention:

- Read [“Installation Guidelines” on page 31](#) and [“Safety inspection checklist” on page 32](#) to ensure that you work safely.
- Make sure to remove or install memory module 20 seconds after disconnecting power cords from the system. It allows the system to be completely discharged of electricity and safe for handling memory module.
- Memory modules are sensitive to static discharge and require special handling. In addition to the standard guidelines for [“Handling static-sensitive devices” on page 34](#):
 - Always wear an electrostatic-discharge strap when removing or installing memory modules. Electrostatic-discharge gloves can also be used.

- Never hold two or more memory modules together so that they touch. Do not stack memory modules directly on top of each other during storage.
- Never touch the gold memory module connector contacts or allow these contacts to touch the outside of the memory-module connector housing.
- Handle memory modules with care: never bend, twist, or drop a memory module.
- Do not use any metal tools (such as jigs or clamps) to handle the memory modules, because the rigid metals may damage the memory modules.
- Do not insert memory modules while holding packages or passive components, which can cause package cracks or detachment of passive components by the high insertion force.
- DIMM fillers must be installed in unused slots for proper cooling.
- Before installing 24 Gb DRAM RDIMMs to a system with 4th Gen Intel Xeon processors (codenamed Sapphire Rapids), make sure to update the UEFI firmware to the latest version first, then remove all existing 16 Gb DRAM RDIMMs.

The following illustration shows the location of the memory module connectors on the system board.

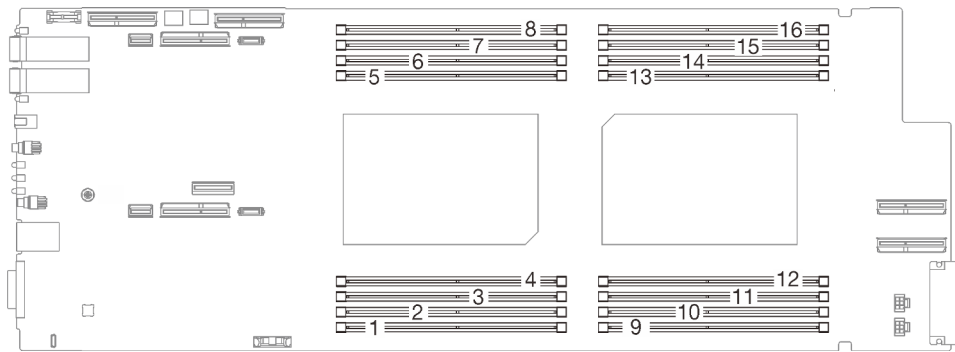


Figure 139. Memory module connector location

Note: The following illustration might differ slightly from your hardware, but the installation method is the same.

Procedure

Attention: Make sure to remove or install memory module 20 seconds after disconnecting power cords from the system. It allows the system to be completely discharged of electricity and safe for handling memory module.

Step 1. Remove the memory module tool attached to the DIMM comb.

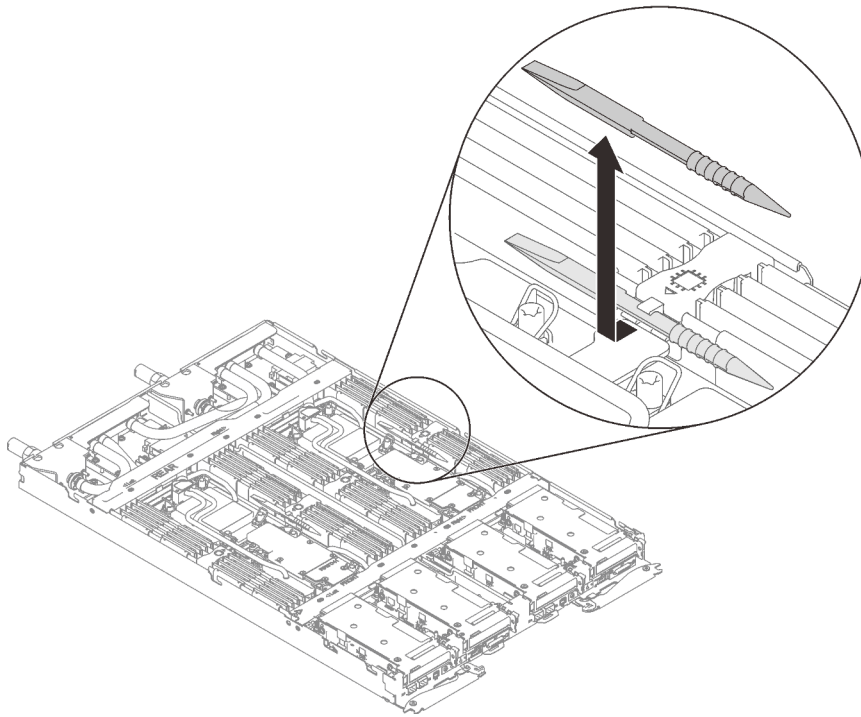


Figure 140. Memory module tool removal

Note: Memory module tool is recommended due to space limitations caused by location of water loop tubes through the memory section.

- Step 2. Unlock the retaining clips on each end of the memory module connector with the memory module tool.
- a. ① Place the tip of the tool on the top of the retaining clip.
 - b. ② Press the tool to rotate and unlock the retaining clip.

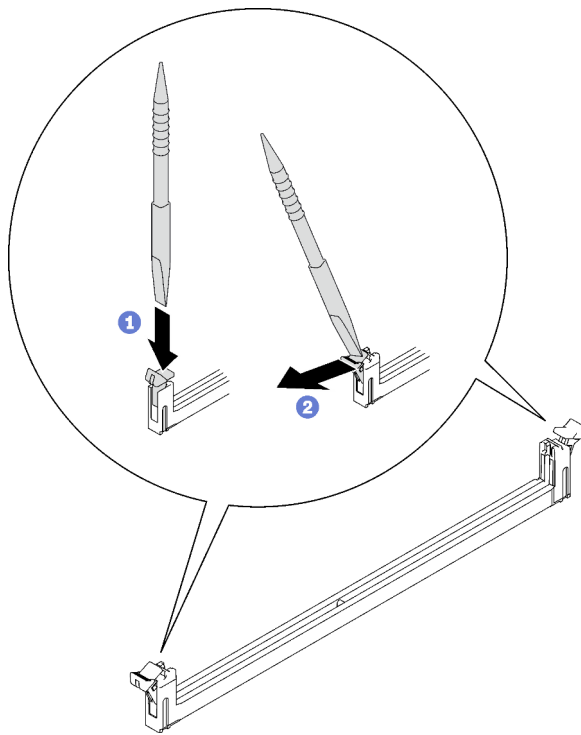


Figure 141. Pressing retaining clips on memory module connector

Attention:

- Memory modules are static-sensitive devices. The package must be grounded before it is opened.
- To avoid breaking the retaining clips or damaging the memory module connectors, open and close the clips gently.

- Step 3. Touch the static-protective package that contains the memory module to any unpainted metal surface on the outside of the node; then, remove the memory module from the package.
- Step 4. Align the memory module with the slot, and gently place the memory module on the slot with both hands.
- Step 5. Install the memory module.
- a. Hold the right end and left end of the memory module at the same time and keep it in parallel with the connector.
 - b. Align the memory module with the connector while gently placing it onto the connector. Then, firmly press both ends of the memory module straight down into the connector until the retaining clips snap into the locked position.

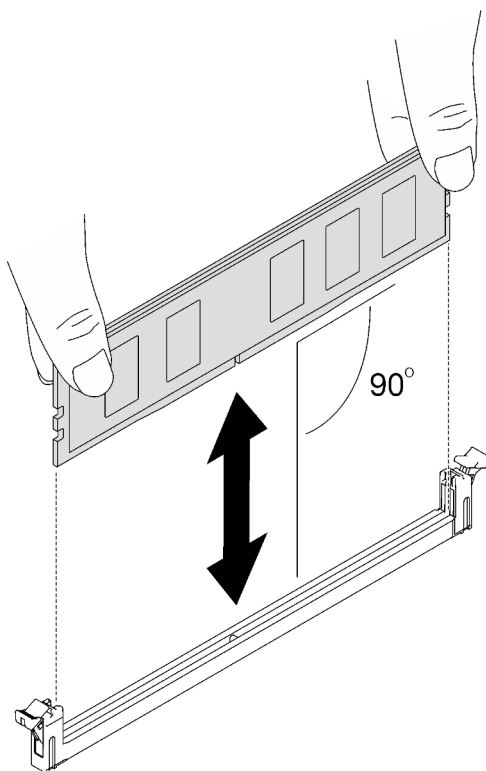
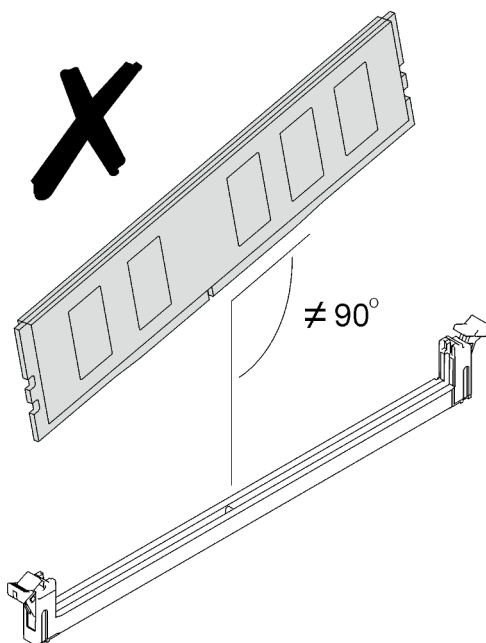


Figure 142. Memory module installation

Note: Memory module should be in horizontal position during installation.



Step 6. Make sure the retaining clips are properly locked. If the retaining clips are open, firmly press right and left ends of the memory module until the clips are locked.

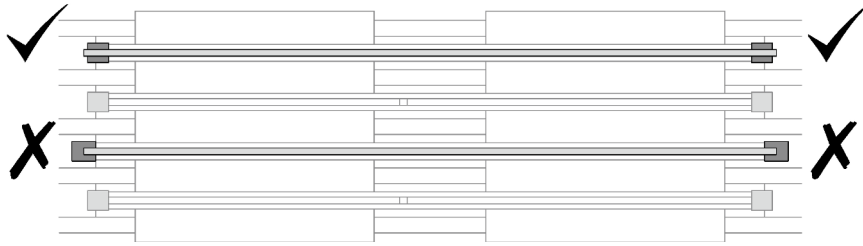


Figure 143. Open and locked retaining clips on memory module connector

Step 7. Install the memory module tool to the DIMM comb.

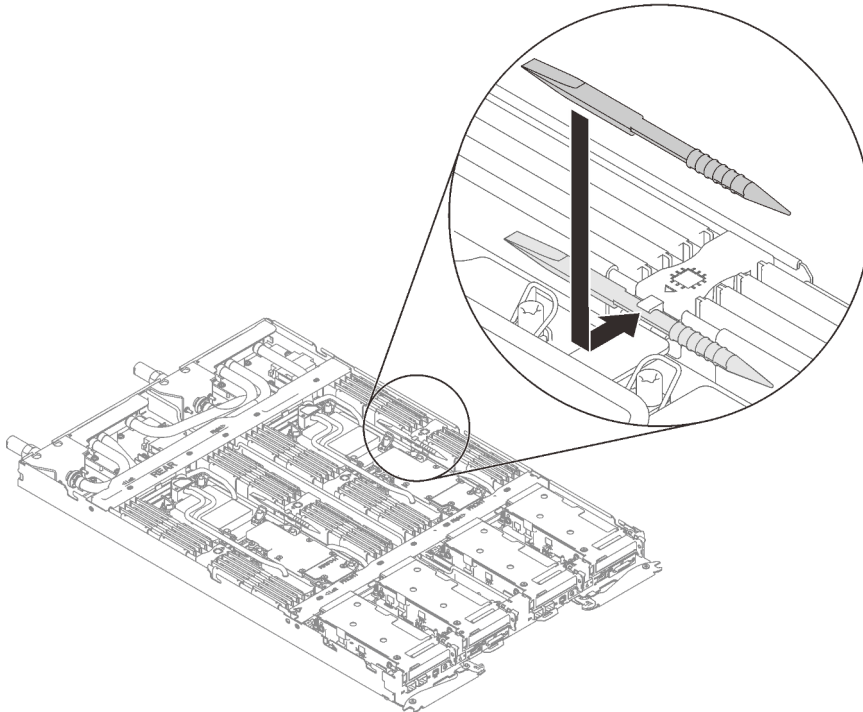


Figure 144. Memory module tool installation

After you finish

1. Install the tray cover. See [“Install the tray cover” on page 49](#).
2. Install the tray into the enclosure. See [“Install a DWC tray in the enclosure” on page 46](#).
3. Connect all required external cables to the solution.

Note: Use extra force to connect QSFP cables to the solution.

4. Check the power LED on each node to make sure it changes from fast blink to slow blink to indicate all nodes are ready to be powered on.

Demo video

[Watch the procedure on YouTube](#)

PCIe adapter replacement

Use the following procedures to remove and install a PCIe adapter.

Remove a PCIe adapter

Use this information to remove a PCIe adapter.

About this task

Attention:

- Read [“Installation Guidelines” on page 31](#) and [“Safety inspection checklist” on page 32](#) to ensure that you work safely.
- Turn off the corresponding DWC tray that you are going to perform the task on.
- Disconnect all external cables from the enclosure.
- Use extra force to disconnect QSFP cables if they are connected to the solution.

Note: The following illustration might differ slightly from your hardware, but the removal method is the same.

Procedure

Step 1. Make preparations for this task.

- a. Remove the tray from the enclosure. See [“Remove a DWC tray from the enclosure” on page 45](#).
- b. Remove the tray cover. See [“Remove the tray cover” on page 48](#).
- c. Remove the PCIe riser assembly. Depending on your configuration, see [“Remove a PCIe riser assembly \(ConnectX-6\)” on page 156](#), [“PCIe riser assembly replacement \(ConnectX-7 NDR 200\)” on page 165](#), or [“Remove a PCIe riser assembly \(ConnectX-7 NDR 400\)” on page 175](#).

Step 2. Remove the screw; then, grasp the adapter by its edges and carefully pull it out of the PCIe riser-cage.

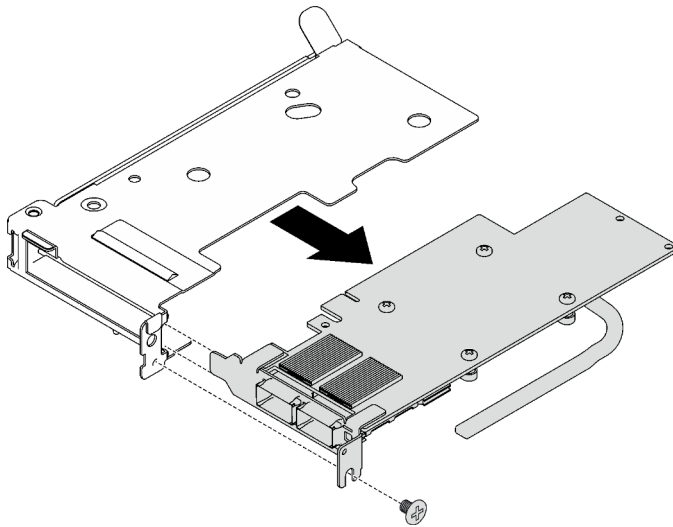


Figure 145. PCIe adapter removal

Step 3. For shared I/O or socket direct configurations, disconnect the cable.

- a. ① Carefully pull the two latches outward.
- b. ② Open the bottom cable clip cover.
- c. ③ Remove the cable clip away from the connectors.
- d. ④ Gently grasp and pull the black plastic sheets outward.

- e. 5 Pull the cable connectors out of the adapter.

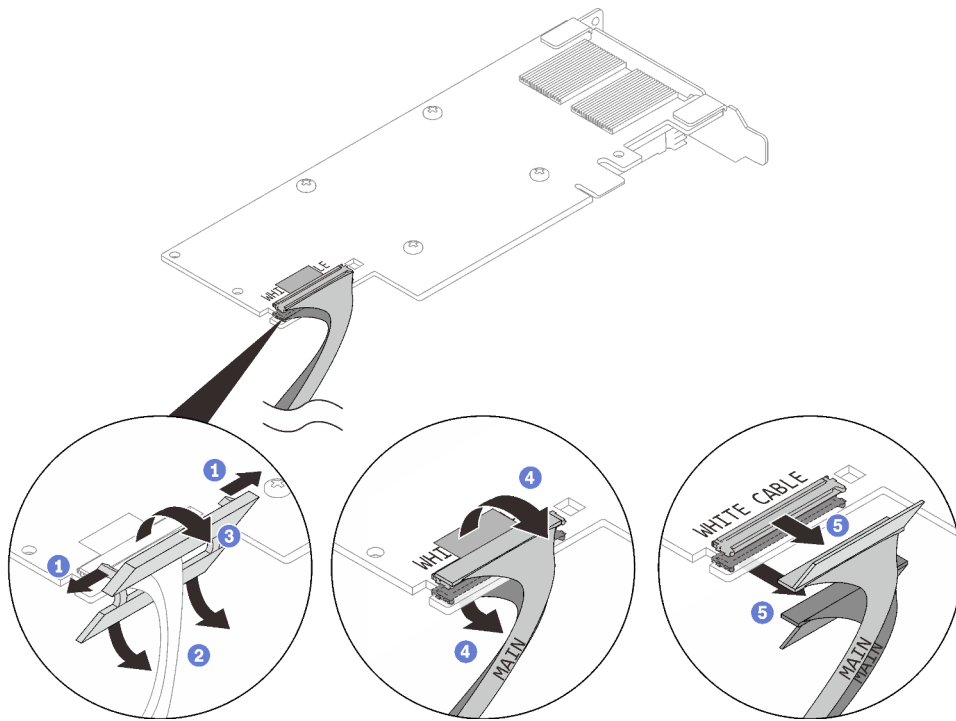


Figure 146. PCIe adapter cable removal

- Step 4. If necessary, install a filler into the PCIe riser-cage and secure it with a screw.

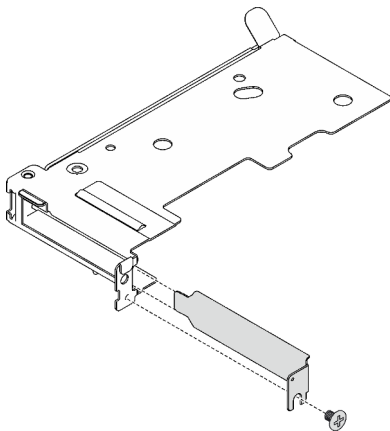


Figure 147. Filler installation

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

[Watch the procedure on YouTube](#)

Install a PCIe adapter

Use this information to install a PCIe adapter.

About this task

Attention:

- Read [“Installation Guidelines” on page 31](#) and [“Safety inspection checklist” on page 32](#) to ensure that you work safely.

Note: The following illustration might differ slightly from your hardware, but the installation method is the same.

Procedure

Step 1. If a filler is installed, remove the screw and remove the filler out of the PCIe riser-cage.

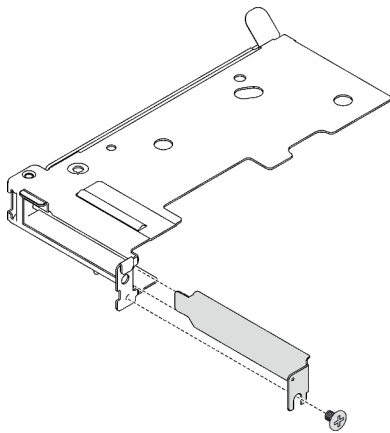


Figure 148. Filler removal

- Step 2. For shared I/O or socket direct configurations, connect the cable.
- 1 Gently push the connectors into the slots.
 - 2 Close the cable covers and slightly press the cable covers until they click into place.
 - 3 Insert the two latches into the slots next to the connectors.
 - 4 Close the cable clip covers and slightly press them to secure the connectors.

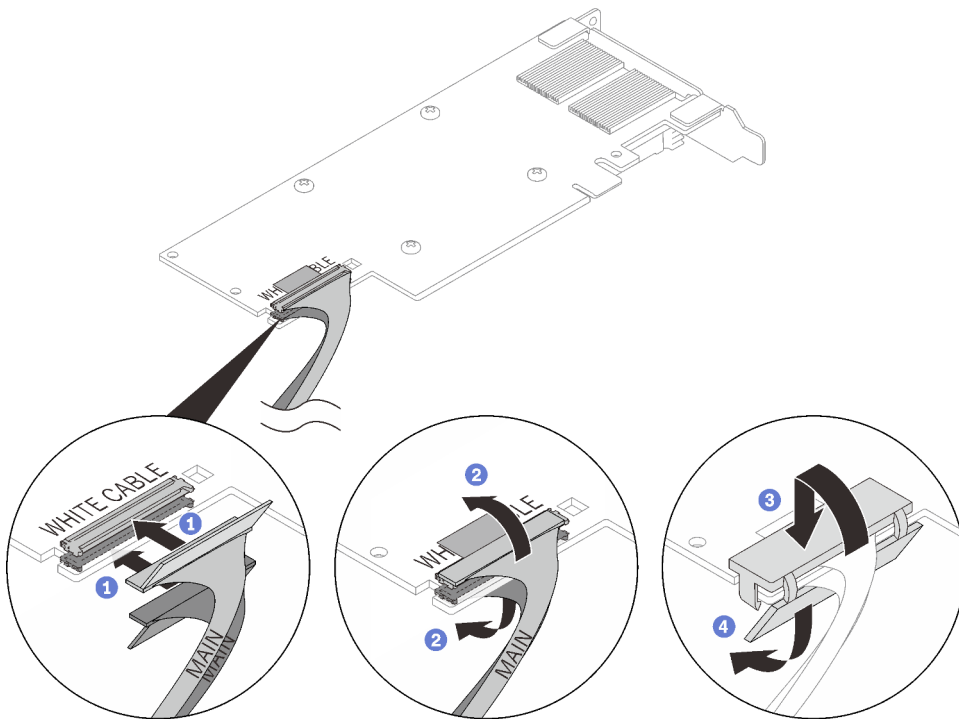


Figure 149. PCIe adapter cable installation

Attention:

- There are **WHITE CABLE** and **BLACK CABLE** callouts on the adapter, connect the cables to the connectors according to the cable colors.
- There are **MAIN** and **AUX** labels on cables, connect **MAIN** ends to the main adapter and connect **AUX** ends to the auxiliary adapter.

Step 3. Align the adapter with the PCIe slot on the riser-cage; then, carefully press the adapter straight into the slot until it is securely seated. Fasten the screw to secure the adapter.

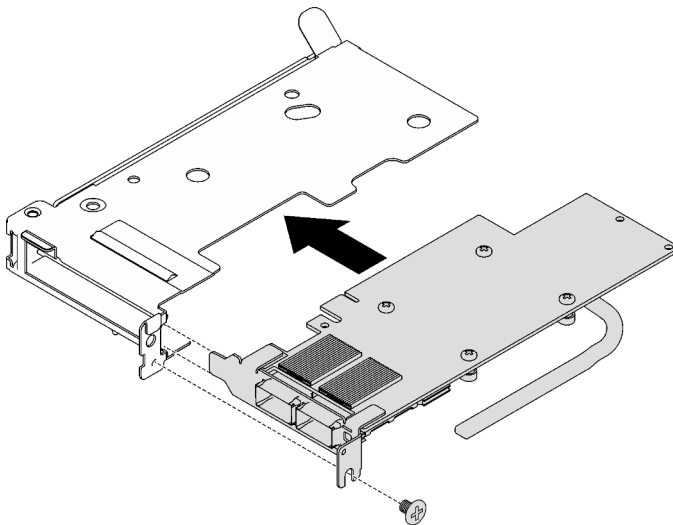


Figure 150. PCIe adapter installation

After you finish

1. Install the PCIe riser assembly. See [“Install a PCIe riser assembly \(ConnectX-6\)” on page 160](#) , [“PCIe riser assembly replacement \(ConnectX-7 NDR 200\)” on page 165](#), or [“Install a PCIe riser assembly \(ConnectX-7 NDR 400\)” on page 181](#).
2. Install the tray cover. See [“Install the tray cover” on page 49](#).
3. Install the tray into the enclosure. See [“Install a DWC tray in the enclosure” on page 46](#).
4. Connect all required external cables to the solution.

Note: Use extra force to connect QSFP cables to the solution.

5. Check the power LED on each node to make sure it changes from fast blink to slow blink to indicate all nodes are ready to be powered on.

Demo video

[Watch the procedure on YouTube](#)

PCIe riser assembly replacement (ConnectX-6)

Use the following procedures to remove and install a PCIe riser assembly with ConnectX-6 adapter.

- For PCIe riser with ConnectX-7 NDR 200 adapter, see [“PCIe riser assembly replacement \(ConnectX-7 NDR 200\)” on page 165](#).
- For PCIe riser with ConnectX-7 NDR 400 adapter, see [“PCIe riser assembly replacement \(ConnectX-7 NDR 400\)” on page 175](#).

Remove a PCIe riser assembly (ConnectX-6)

Use this information to remove a PCIe riser assembly with ConnectX-6 adapter.

About this task

Required tools

Make sure you have the following kits at hand to properly replace the component:

- Miscellaneous parts kit
- Conduction plate parts (only damaged parts need to be replaced)
- ConnectX-6 Putty pad kit

Attention:

- Read [“Installation Guidelines” on page 31](#) and [“Safety inspection checklist” on page 32](#) to ensure that you work safely.
- Turn off the corresponding DWC tray that you are going to perform the task on.
- Disconnect all external cables from the enclosure.
- Use extra force to disconnect QSFP cables if they are connected to the solution.

Procedure

Step 1. Make preparations for this task.

- a. Remove the tray from the enclosure. See [“Remove a DWC tray from the enclosure” on page 45](#).
- b. Remove the tray cover. See [“Remove the tray cover” on page 48](#).

- c. For shared I/O or socket direct configurations, disconnect the cable from the system board. See [Chapter 6 “Internal cable routing” on page 233](#).

Step 2. If a heatpipe beam is installed, remove the screw that secures the heatpipe beam and remove it.

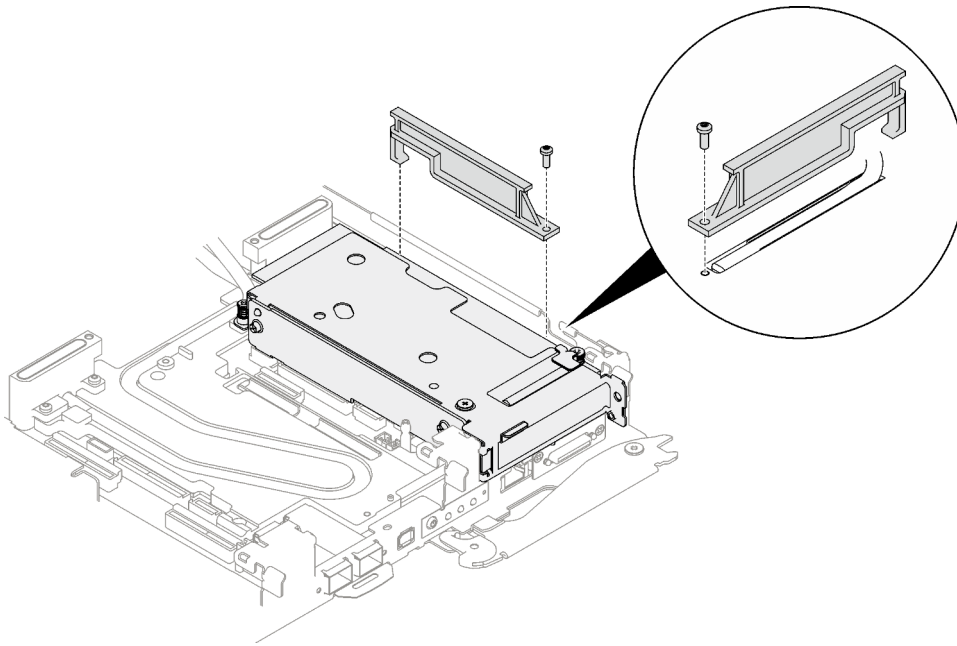


Figure 151. Heatpipe beam removal

Step 3. Loosen the PCIe riser assembly.

- a. ① Loosen the captive screw on the PCIe riser assembly.
- b. ② Loosen the captive screw on the clamp bracket and remove it.
- c. ③ Remove the screw that secures the riser assembly.

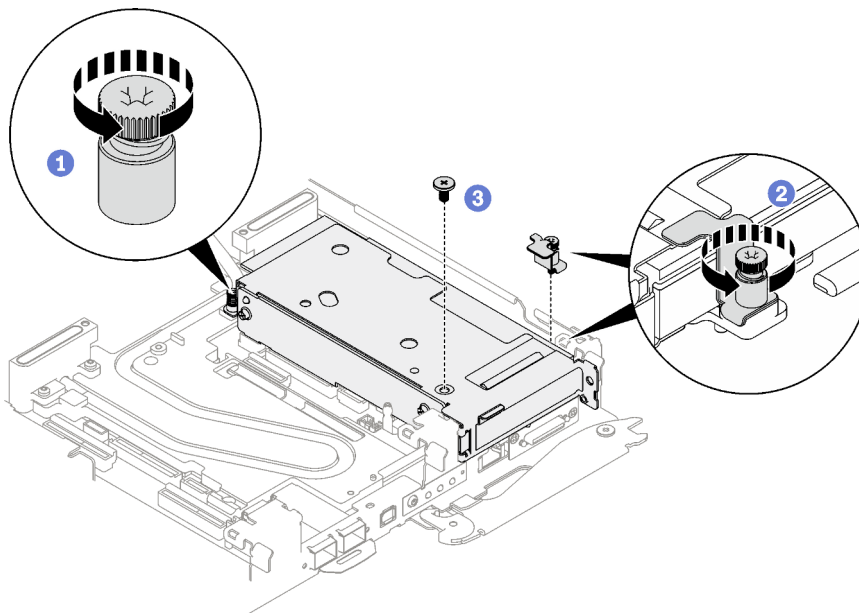


Figure 152. Clamp bracket captive screw removal

Step 4. Carefully grasp the PCIe riser-cage assembly by its edges and remove it out of the node.

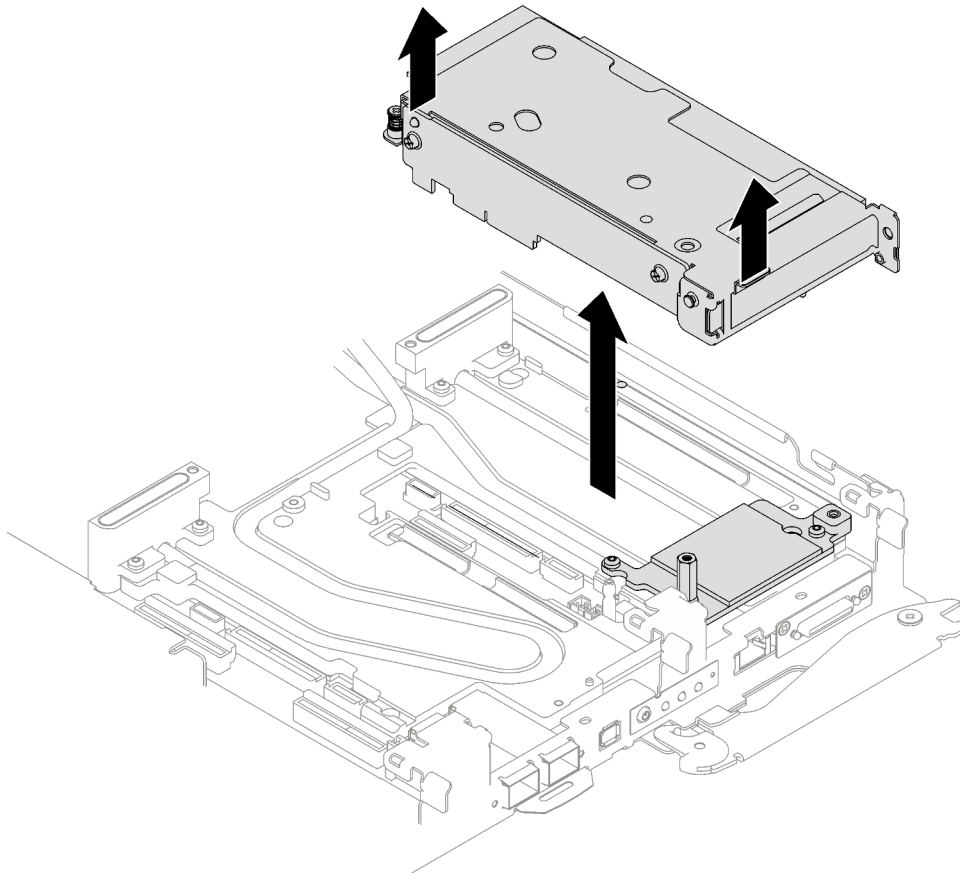


Figure 153. PCIe riser assembly removal

Step 5. If necessary, remove the hex standoff screw and the two Torx T10 screws that secure the interface plate; then, remove the interface plate.

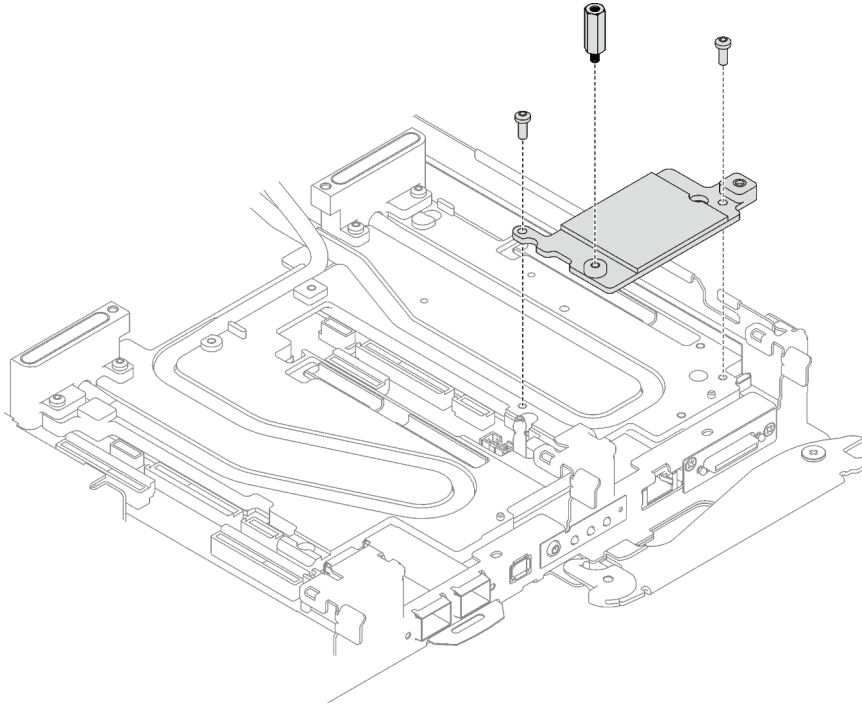


Figure 154. Interface plate removal

Step 6. If necessary, install the blank bezel fillers.

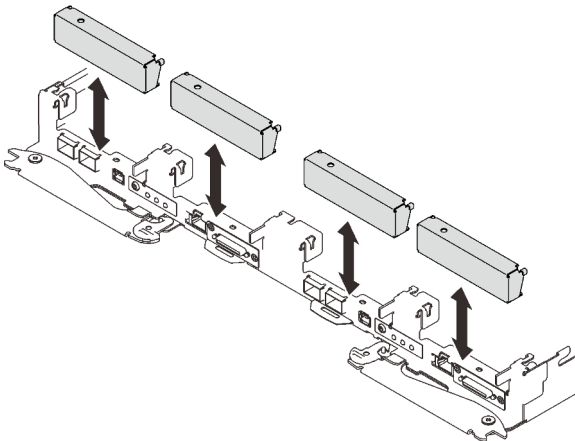


Figure 155. Blank bezel filler installation

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

If you need to disassemble the PCIe riser assembly, follow the instructions below:

Attention: You can only disassemble a PCIe riser assembly for recycle. Do not disassemble it for any other purposes.

1. Remove the two screws, then, separate the expansion board from the cage.

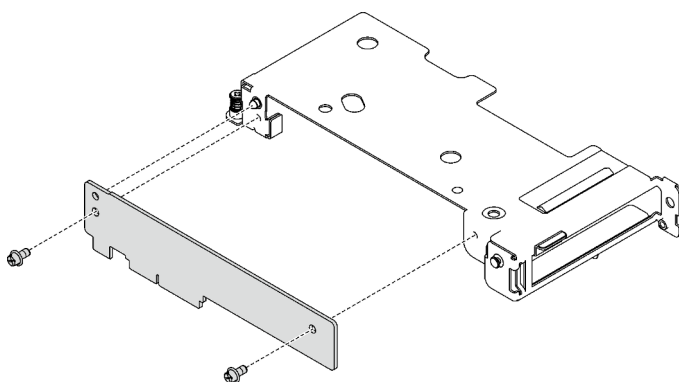


Figure 156. Expansion board removal

2. Recycle the unit in compliance with local regulations.

Demo video

[Watch the procedure on YouTube](#)

Install a PCIe riser assembly (ConnectX-6)

Use this information to install a PCIe riser assembly with ConnectX-6 adapter.

About this task

Required tools

Make sure you have the following kits at hand to properly replace the component:

- Miscellaneous parts kit
- Conduction plate parts (only damaged parts need to be replaced)
- ConnectX-6 Putty pad kit

Important: Gap pad/putty pad replacement guidelines

- To identify the gap pad/putty pad location and orientation, see [“Gap pad/Putty pad identification and location” on page 40](#).
- Before replacing the gap pad/putty pad, gently clean the interface plate or the hardware surface with an alcohol cleaning pad.
- Hold the gap pad/putty pad carefully to avoid deformation. Make sure no screw hole or opening is blocked by the gap pad/putty pad material.
- Do not use expired putty pad. Check the expiry date on putty pad package. If the putty pads are expired, acquire new ones to properly replace them.

Attention:

- Read [“Installation Guidelines” on page 31](#) and [“Safety inspection checklist” on page 32](#) to ensure that you work safely.
- Turn off the corresponding DWC tray that you are going to perform the task on.
- Disconnect all external cables from the enclosure.
- Use extra force to disconnect QSFP cables if they are connected to the solution.

Note: For more information on selecting riser slot for PCIe riser installation, see [“PCIe adapter in compute node cable routing”](#) on page 233.

Procedure

Step 1. Remove the blank bezel fillers if they are installed.

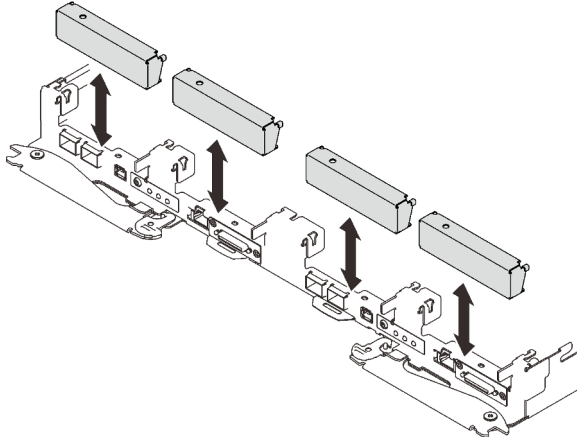


Figure 157. Blank bezel filler removal

Step 2. If the interface plate was removed, place the interface plate onto the node; then, secure the interface plate with two Torx T10 screws.

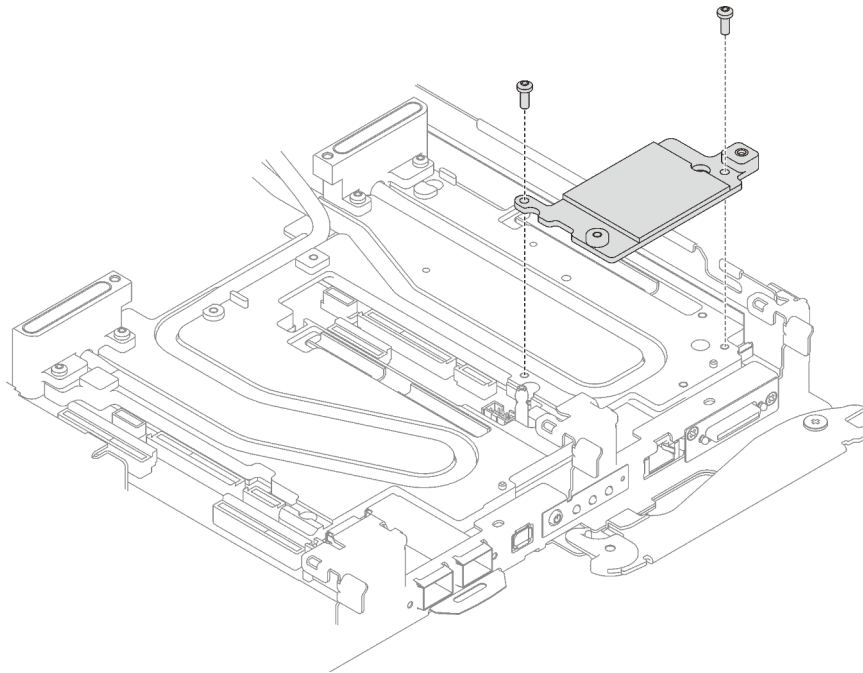


Figure 158. Interface plate installation

Step 3. Replace the interface plate putty pad with a new one. Make sure to follow [Gap pad/putty pad replacement guidelines](#).

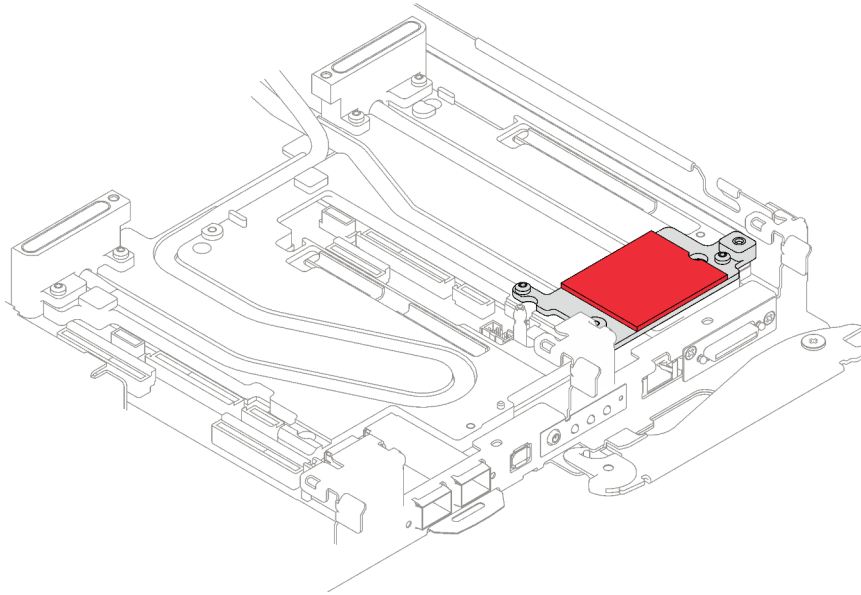


Figure 159. Interface plate putty pad for CX-6 riser

Step 4. Install the PCIe riser assembly.

- a. ① Install one hex standoff screw to the cold plate.
- b. ② Align the tab on the PCIe riser assembly with the slot on the front of the node; then, insert the PCIe riser assembly onto the system board.
- c. ③ Secure the riser assembly with one screw.

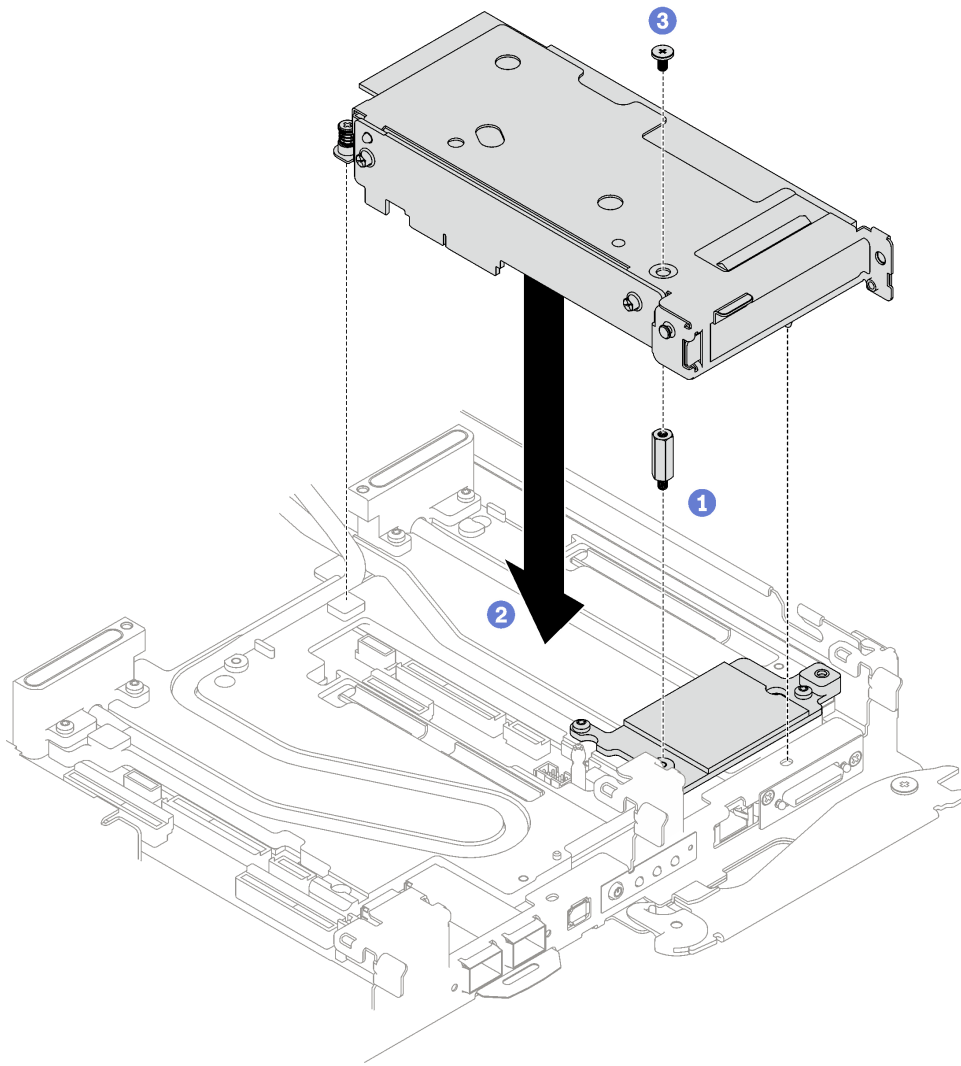


Figure 160. PCIe riser assembly installation

- Step 5. Secure the PCIe riser assembly.
- 1 Install the clamp bracket and fasten the captive screw.
 - 2 Fasten the captive screw on the PCIe riser assembly.

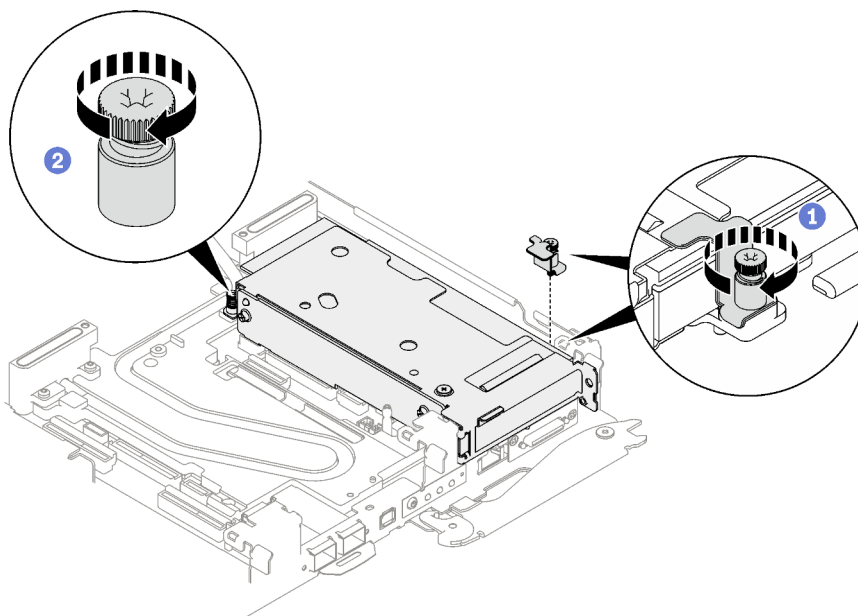


Figure 161. Clamp bracket captive screw installation

Step 6. If necessary, install the heatpipe beam and secure it with one screw.

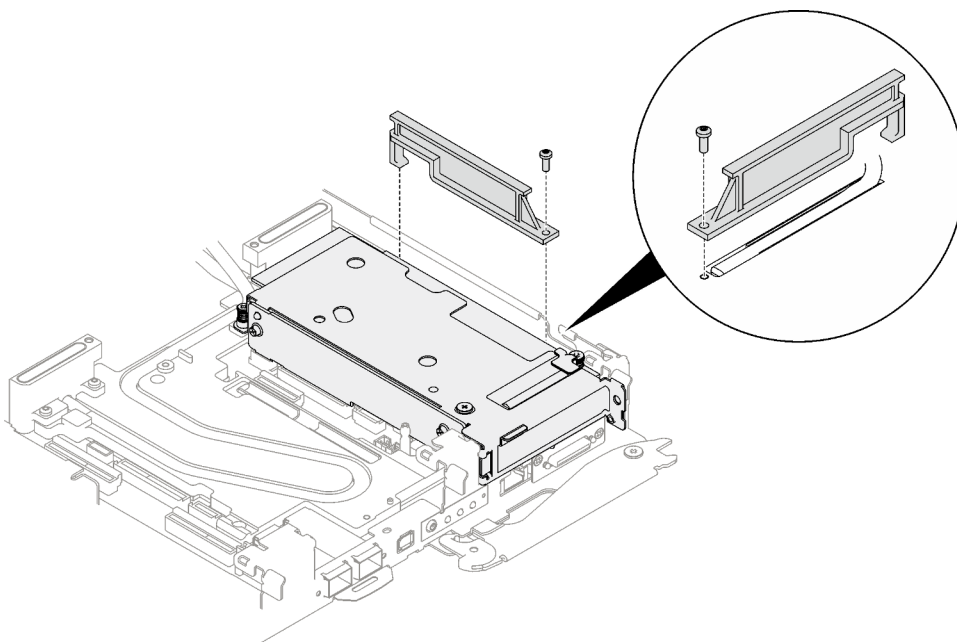


Figure 162. Heatpipe beam installation

After you finish

1. For shared I/O or socket direct configurations, route the cables. See [Chapter 6 “Internal cable routing” on page 233](#) for cable routing details.
2. Install the tray cover. See [“Install the tray cover” on page 49](#).
3. Install the tray into the enclosure. See [“Install a DWC tray in the enclosure” on page 46](#).

Attention: Shared I/O configuration requires specific power on and power off sequence for the two nodes, see below:

- Power on sequence: first, power on the node with **main** adapter (right node); then, power on the node with **auxiliary** adapter (left node).
- Power off sequence: first, power off the node with **auxiliary** adapter (left node); then, power off the node with **main** adapter (right node).

4. Connect all required external cables to the solution.

Note: Use extra force to connect QSFP cables to the solution.

5. Check the power LED on each node to make sure it changes from fast blink to slow blink to indicate all nodes are ready to be powered on.

Demo video

[Watch the procedure on YouTube](#)

PCIe riser assembly replacement (ConnectX-7 NDR 200)

Use the following procedures to remove and install a PCIe riser assembly with ConnectX-7 NDR 200 adapter.

- For PCIe riser with ConnectX-6 adapter, see [“PCIe riser assembly replacement \(ConnectX-6\)” on page 156](#).
- For PCIe riser with ConnectX-7 NDR 400 adapter, see [“PCIe riser assembly replacement \(ConnectX-7 NDR 400\)” on page 175](#).

Remove a PCIe riser assembly (ConnectX-7 NDR 200)

Use this information to remove a PCIe riser assembly with ConnectX-7 NDR 200 adapter.

About this task

Required tools

Make sure you have the following kits at hand to properly replace the component:

- Miscellaneous parts kit
- CX7 NDR200 Thermal Kits (only damaged conduction plate needs to be replaced)
- ConnectX-7 NDR200 Putty pad kit

Attention:

- Read [“Installation Guidelines” on page 31](#) and [“Safety inspection checklist” on page 32](#) to ensure that you work safely.
- Turn off the corresponding DWC tray that you are going to perform the task on.
- Disconnect all external cables from the enclosure.
- Use extra force to disconnect QSFP cables if they are connected to the solution.

Procedure

Step 1. Make preparations for this task.

- a. Remove the tray from the enclosure. See [“Remove a DWC tray from the enclosure” on page 45](#).
- b. Remove the tray cover. See [“Remove the tray cover” on page 48](#).

- c. For shared I/O or socket direct configurations, disconnect the cable from the system board. See [Chapter 6 “Internal cable routing” on page 233](#).

Step 2. Loosen the PCIe riser assembly.

- a. ① Loosen the captive screw on the clamp bracket and remove it.
- b. ② Loosen the screw on the front of the PCIe riser assembly
- c. ③ Loosen the captive screw on the rear of the PCIe riser assembly.
- d. ④ Remove the two long screws that secure the riser assembly.

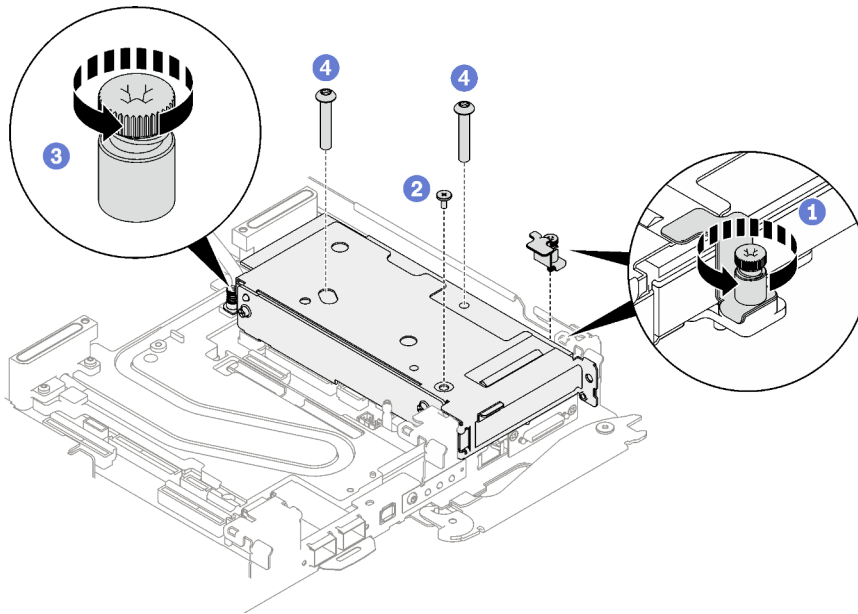


Figure 163. Clamp bracket captive screw removal

Step 3. Carefully grasp the PCIe riser-cage assembly by its edges and remove it out of the node.

Note: The following illustration might differ slightly from your hardware, but the removal method is the same.

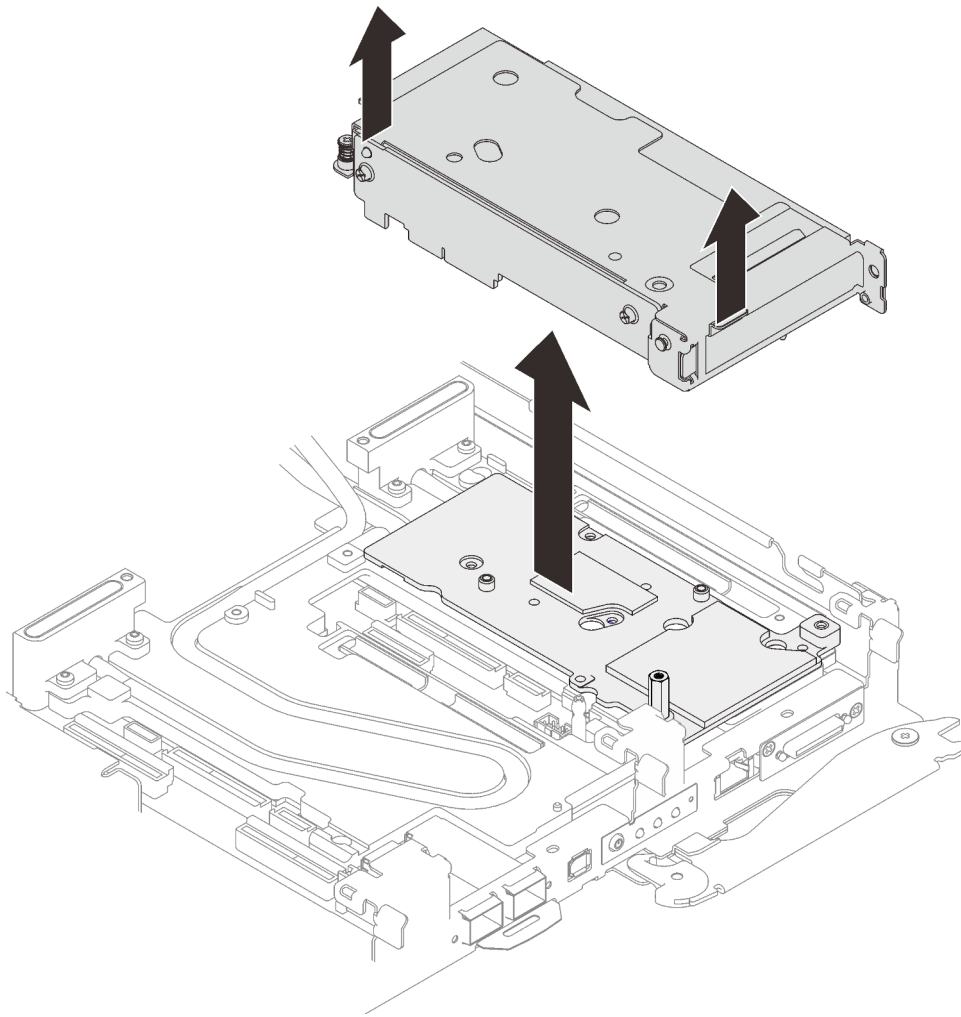


Figure 164. PCIe riser assembly removal

- Step 4. If necessary, remove the interface plate.
- Remove the hex standoff screw and five Torx T10 screws that secure the interface plate.

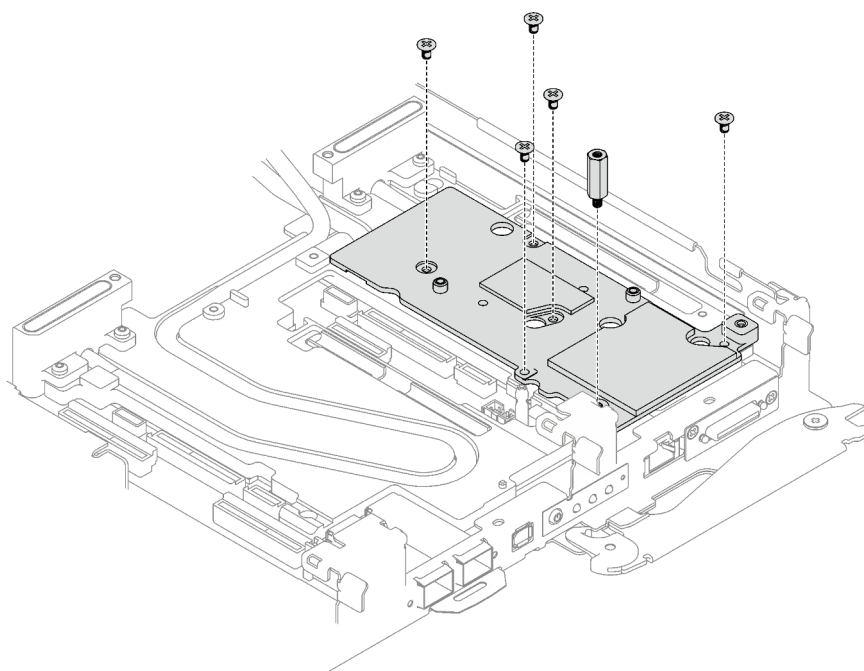


Figure 165. Interface plate removal

- b. Release the interface plate with a flat head screwdriver. (If a flat head screwdriver is not available, the DIMM tool can also be used.)
 1. There are two openings (marked with black triangle in the illustration below) on the bottom side of the interface plate for inserting a flat head screwdriver—select the one that is accessible for the flat head screwdriver.
 2. Insert a flat head screwdriver into the opening; then, slightly rotate the screwdriver to release the interface plate from the water loop cold plate.

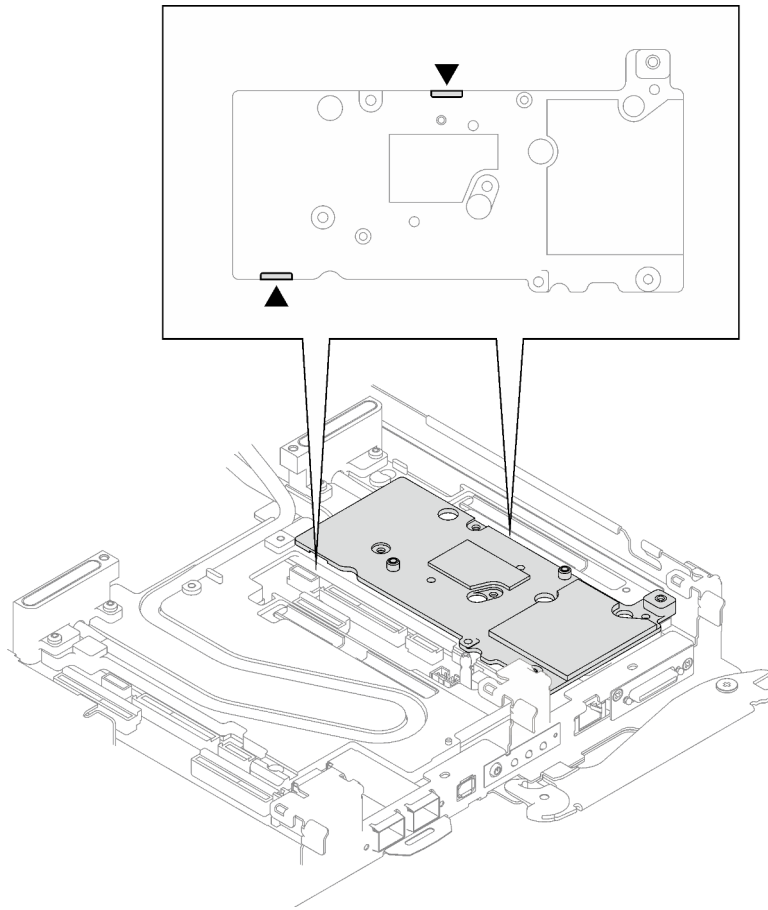


Figure 166. Locations of openings on the bottom side of the interface plate

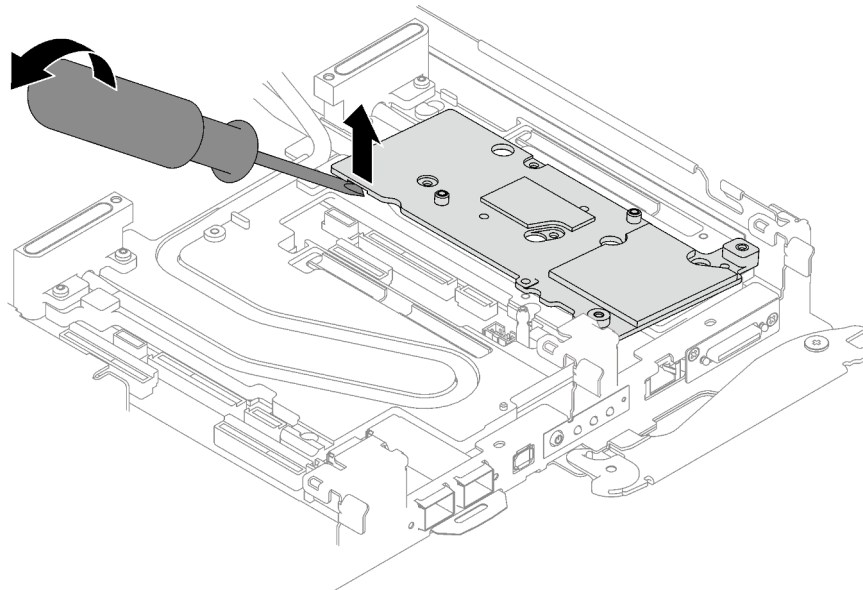


Figure 167. Releasing the interface plate from water loop cold plate

- c. Remove the interface plate from the tray.

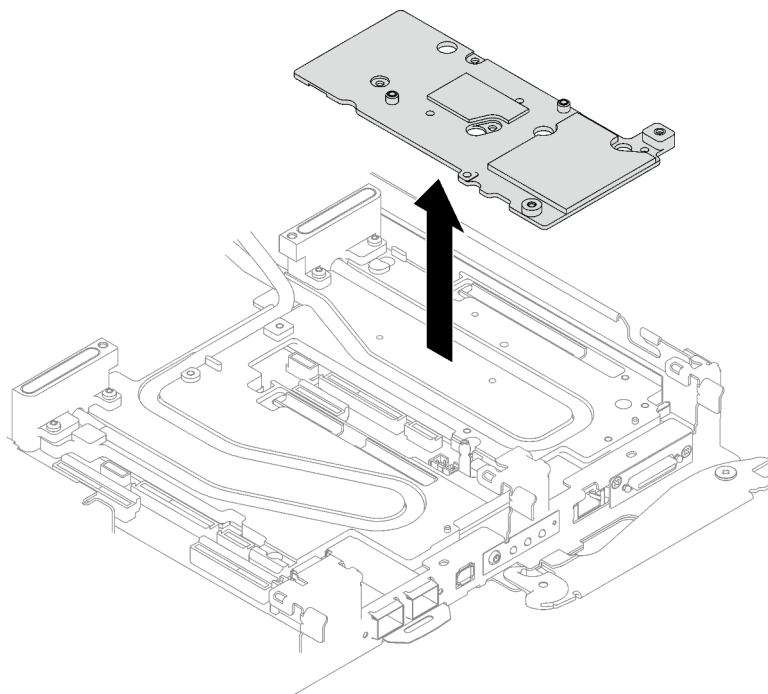


Figure 168. Removing the interface plate

Step 5. If necessary, install the blank bezel fillers.

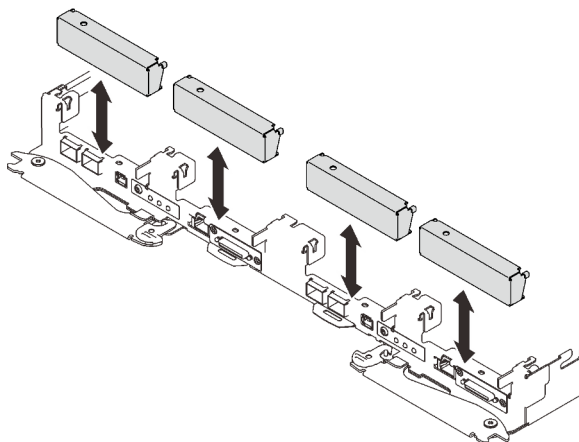


Figure 169. Blank bezel filler installation

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

If you need to disassemble the PCIe riser assembly, follow the instructions below:

Attention: You can only disassemble a PCIe riser assembly for recycle. Do not disassemble it for any other purposes.

1. Remove the two screws, then, separate the expansion board from the cage.

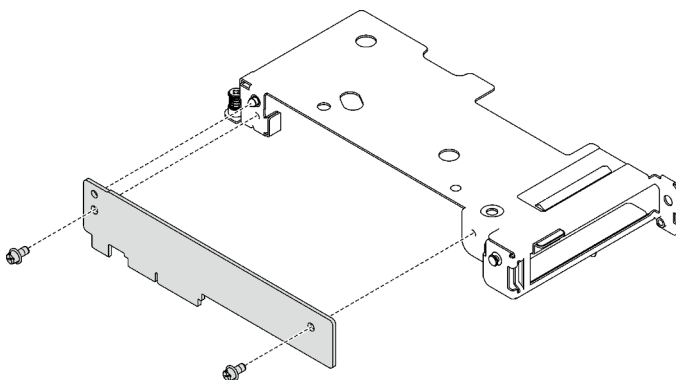


Figure 170. Expansion board removal

2. Recycle the unit in compliance with local regulations.

Install a PCIe riser assembly (ConnectX-7 NDR 200)

Use this information to install a PCIe riser assembly with ConnectX-7 NDR 200 adapter.

About this task

Required tools

Make sure you have the following kits at hand to properly replace the component:

- Miscellaneous parts kit
- CX7 NDR200 Thermal Kits (only damaged conduction plate needs to be replaced)
- ConnectX-7 NDR200 Putty pad kit

Important: Gap pad/putty pad replacement guidelines

- To identify the gap pad/putty pad location and orientation, see [“Gap pad/Putty pad identification and location” on page 40](#).
- Before replacing the gap pad/putty pad, gently clean the interface plate or the hardware surface with an alcohol cleaning pad.
- Hold the gap pad/putty pad carefully to avoid deformation. Make sure no screw hole or opening is blocked by the gap pad/putty pad material.
- Do not use expired putty pad. Check the expiry date on putty pad package. If the putty pads are expired, acquire new ones to properly replace them.

Attention:

- Read [“Installation Guidelines” on page 31](#) and [“Safety inspection checklist” on page 32](#) to ensure that you work safely.
- Turn off the corresponding DWC tray that you are going to perform the task on.
- Disconnect all external cables from the enclosure.
- Use extra force to disconnect QSFP cables if they are connected to the solution.

Note: For more information on selecting riser slot for PCIe riser installation, see [“PCIe adapter in compute node cable routing” on page 233](#).

Procedure

Step 1. Remove the blank bezel fillers if they are installed.

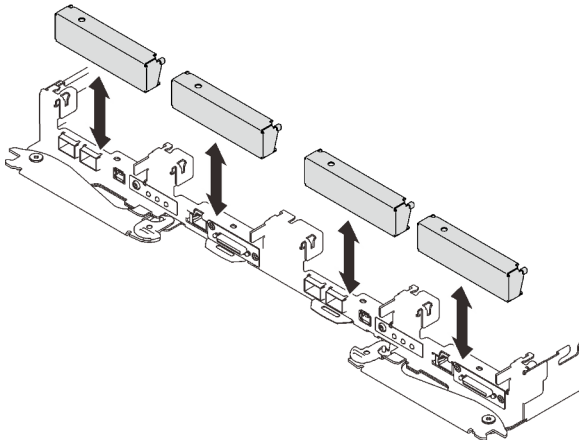


Figure 171. Blank bezel filler removal

Step 2. If the interface plate was removed, place the interface plate onto the node; then, secure the interface plate with five Phillips #2 screws.

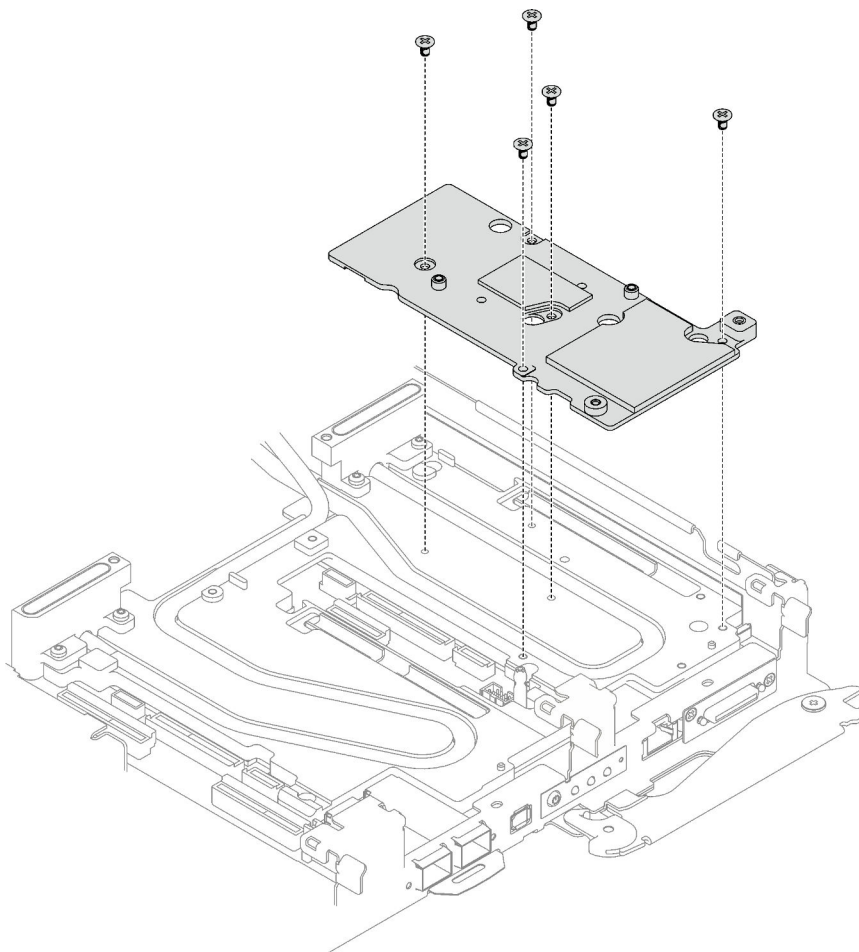


Figure 172. Interface plate installation

Step 3. Replace the interface plate putty pad with a new one. Make sure to follow [Gap pad/putty pad replacement guidelines](#).

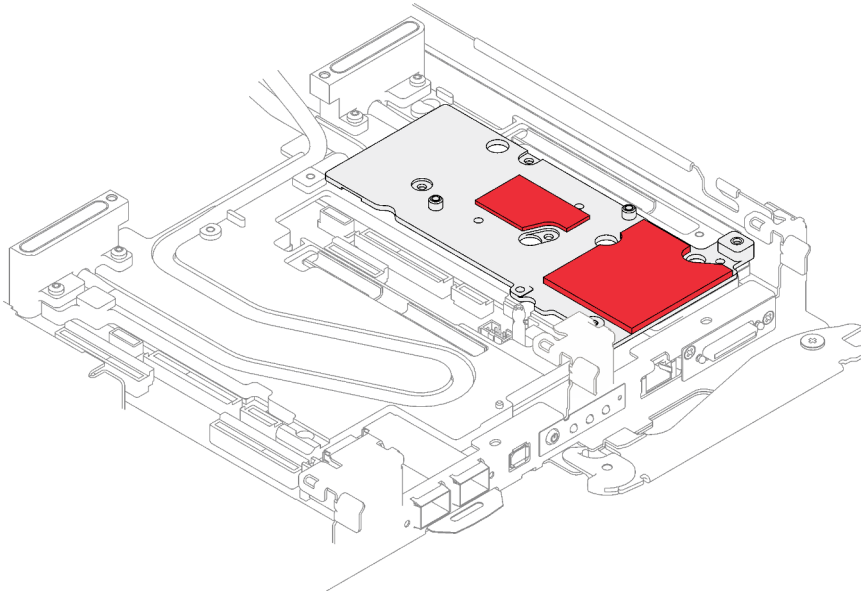


Figure 173. Interface pad on cold plate for CX-7 NDR 200

- Step 4. Install the PCIe riser assembly.
- a. ① Install one hex standoff screw to the cold plate.
 - b. ② Align the tab on the PCIe riser assembly with the slot on the front of the node; then, insert the PCIe riser assembly onto the system board.
 - c. ③ Secure the riser assembly with one screw.

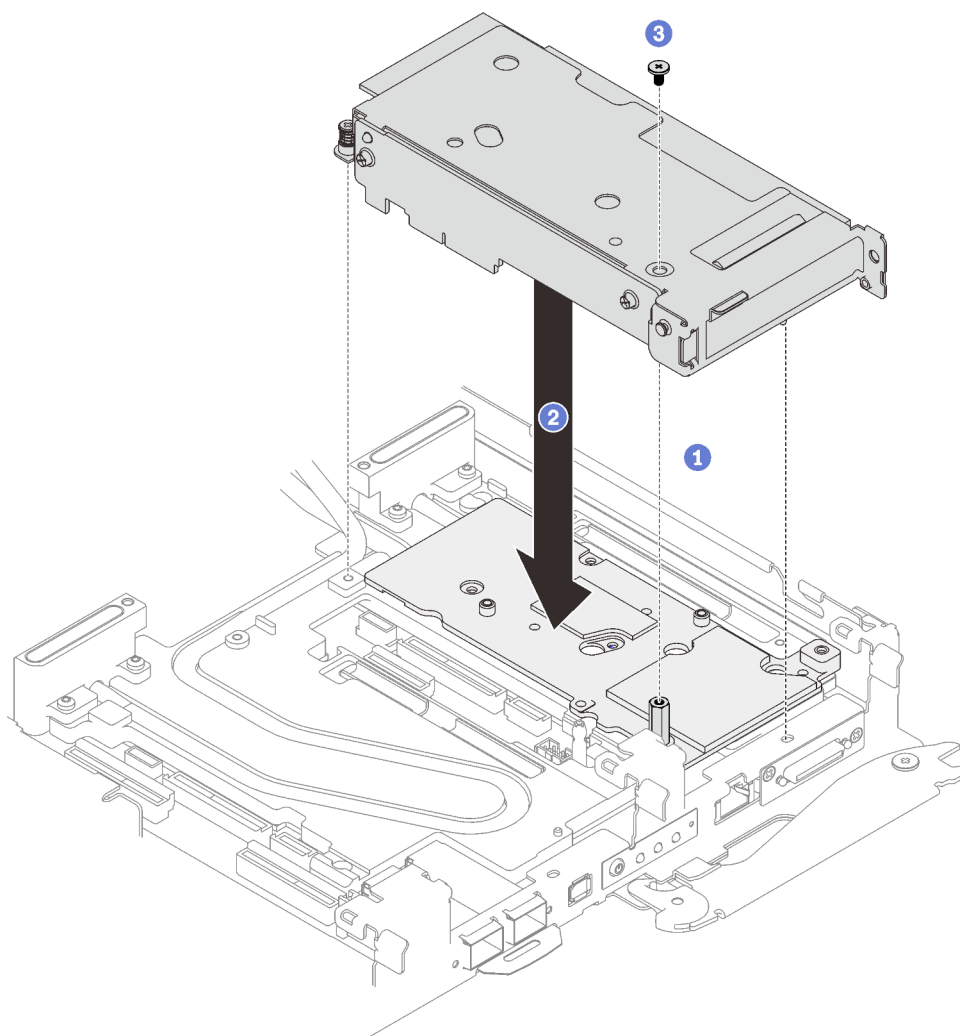


Figure 174. PCIe riser assembly installation

- Step 5. Secure the PCIe riser assembly.
- 1 Install the clamp bracket and fasten the captive screw.
 - 2 Fasten the captive screw on the PCIe riser assembly.
 - 3 Install two screws to secure the PCIe riser assembly.

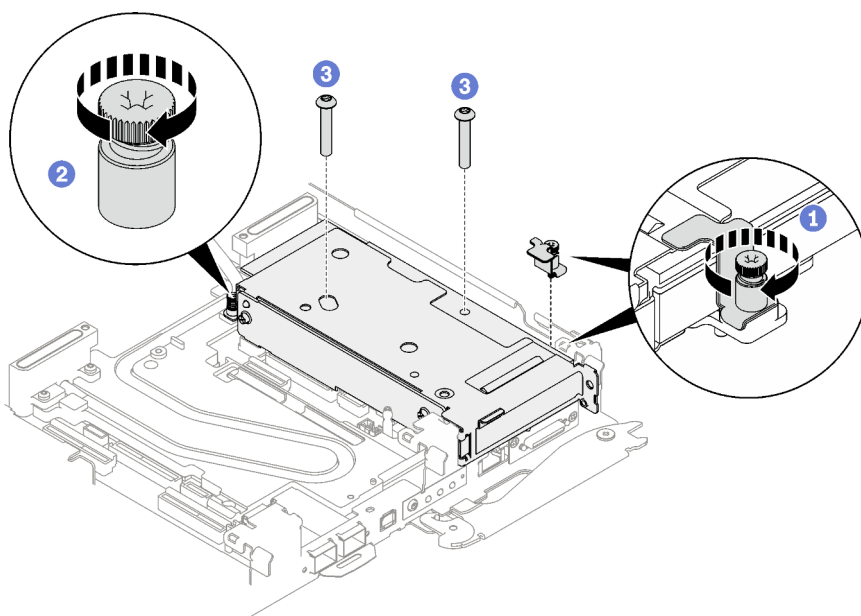


Figure 175. Clamp bracket captive screw installation

After you finish

1. For shared I/O or socket direct configurations, route the cables. See [Chapter 6 “Internal cable routing” on page 233](#) for cable routing details.
2. Install the tray cover. See [“Install the tray cover” on page 49](#).
3. Install the tray into the enclosure. See [“Install a DWC tray in the enclosure” on page 46](#).

Attention: Shared I/O configuration requires specific power on and power off sequence for the two nodes, see below:

- Power on sequence: first, power on the node with **main** adapter (right node); then, power on the node with **auxiliary** adapter (left node).
- Power off sequence: first, power off the node with **auxiliary** adapter (left node); then, power off the node with **main** adapter (right node).

4. Connect all required external cables to the solution.

Note: Use extra force to connect QSFP cables to the solution.

5. Check the power LED on each node to make sure it changes from fast blink to slow blink to indicate all nodes are ready to be powered on.

PCIe riser assembly replacement (ConnectX-7 NDR 400)

Use the following procedures to remove and install a PCIe riser assembly with ConnectX-7 NDR 400 adapter.

- For PCIe riser with ConnectX-6 adapter, see [“PCIe riser assembly replacement \(ConnectX-6\)” on page 156](#).
- For PCIe riser with ConnectX-7 NDR 200 adapter, see [“PCIe riser assembly replacement \(ConnectX-7 NDR 200\)” on page 165](#).

Remove a PCIe riser assembly (ConnectX-7 NDR 400)

Use this information to remove a PCIe riser assembly with ConnectX-7 NDR 400 adapter.

About this task

Required tools

Make sure you have the following kits at hand to properly replace the component:

- Miscellaneous parts kit
- CX7 NDR400 Thermal Kits (only damaged conduction plate needs to be replaced)
- ConnectX-7 NDR400 Putty pad kit

Attention:

- Read [“Installation Guidelines” on page 31](#) and [“Safety inspection checklist” on page 32](#) to ensure that you work safely.
- Turn off the corresponding DWC tray that you are going to perform the task on.
- Disconnect all external cables from the enclosure.
- Use extra force to disconnect QSFP cables if they are connected to the solution.

Procedure

Step 1. Make preparations for this task.

- a. Remove the tray from the enclosure. See [“Remove a DWC tray from the enclosure” on page 45](#).
- b. Remove the tray cover. See [“Remove the tray cover” on page 48](#).
- c. For shared I/O or socket direct configurations, disconnect the cable from the system board. See [Chapter 6 “Internal cable routing” on page 233](#).

Step 2. Remove the PCIe riser assembly.

- a. ❶ Loosen the captive screw on the PCIe riser assembly.
- b. ❷ Remove the three screws that secure the riser assembly.

Note: The following illustration might differ slightly from your hardware, but the removal method is the same.

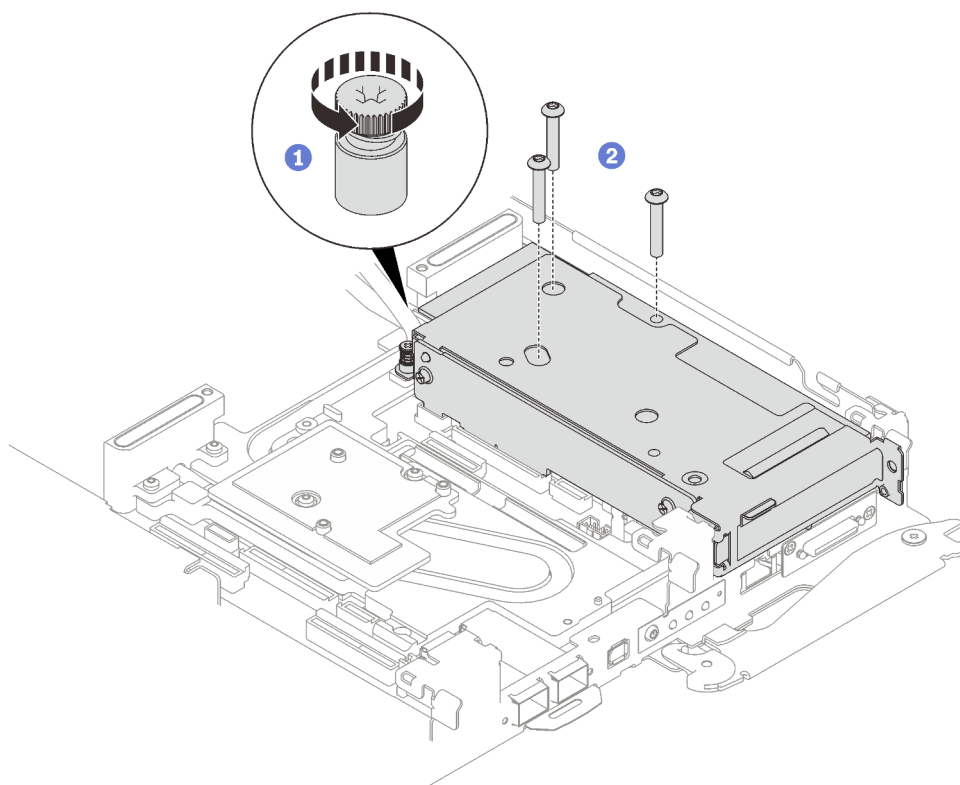


Figure 176. PCIe riser assembly removal

- c. Insert a flat head screwdriver into the gap between the PCIe adapter and the interface plate; then, slightly rotate the flat head screwdriver to release the PCIe riser cage from the water loop cold plate.

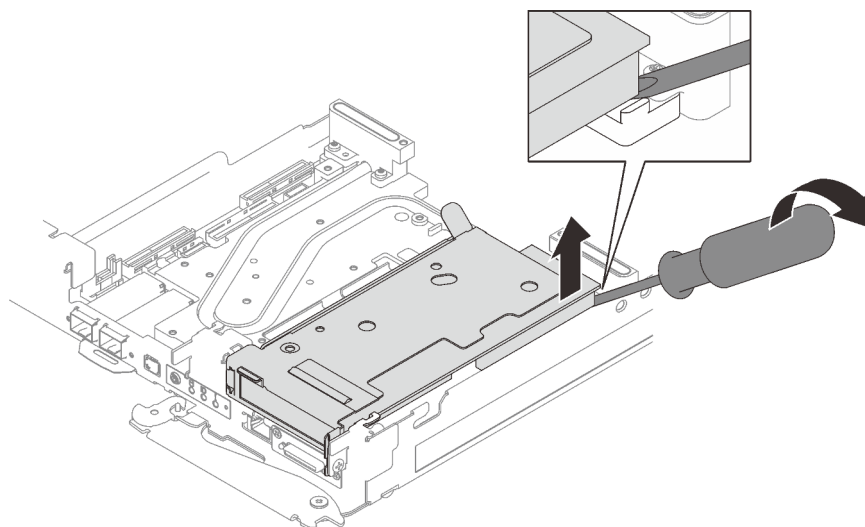


Figure 177. Releasing the PCIe riser cage from the water loop cold plate

- d. ③ Carefully grasp the PCIe riser-cage assembly by its edges and remove it out of the node.

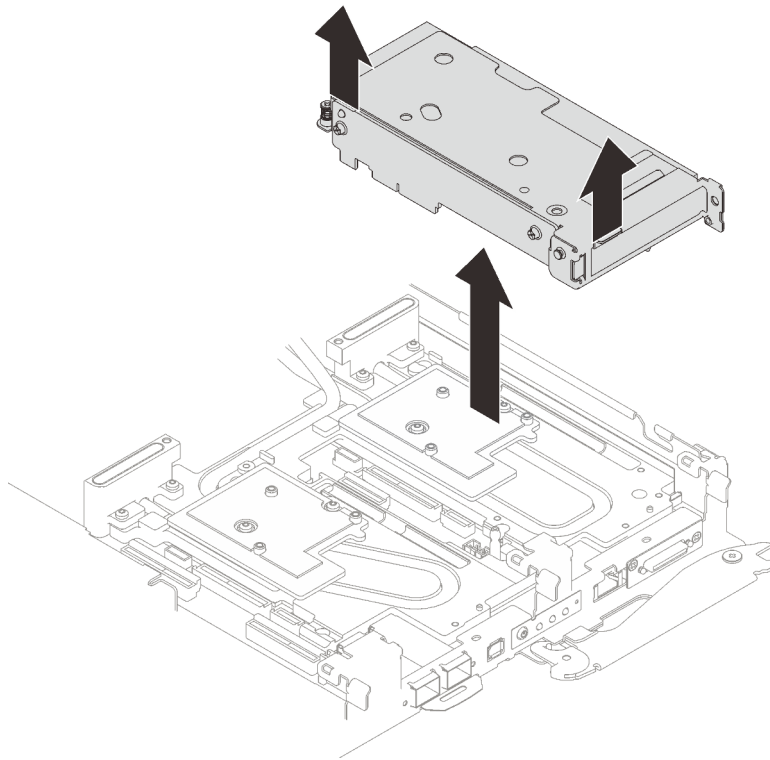


Figure 178. Removing the PCIe riser cage assembly

- Step 3. If necessary, remove the interface plate.
- Remove the two Phillips #2 screws that secure the interface plate.

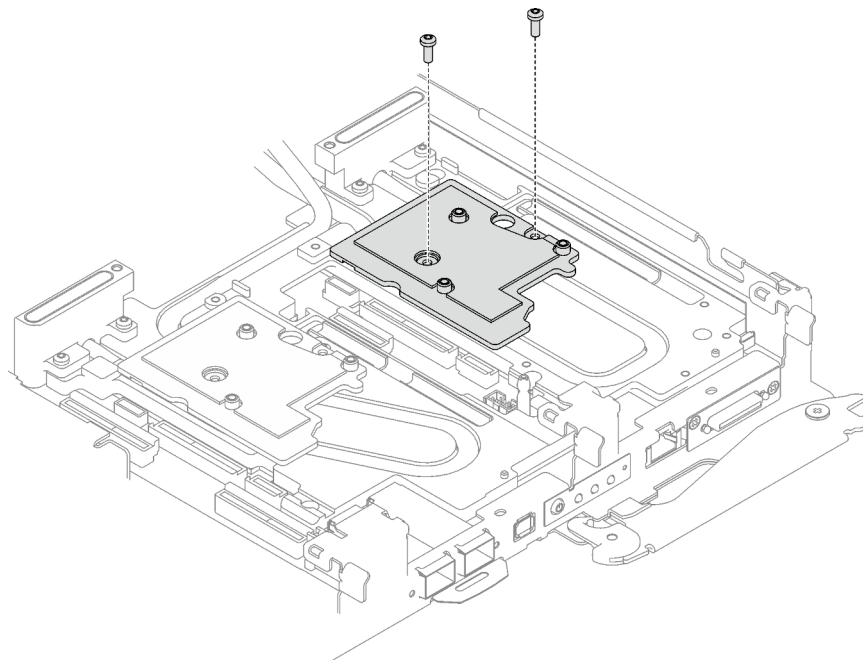


Figure 179. Interface plate removal

- b. Release the interface plate with a flat head screwdriver. (If a flat head screwdriver is not available, the DIMM tool can also be used.)
1. There are two openings (marked with black triangle in the illustration below) on the bottom side of the interface plate for inserting a flat head screwdriver—select the one that is accessible for the flat head screwdriver.
 2. Insert a flat head screwdriver into the opening; then, slightly rotate the screwdriver to release the interface plate from the water loop cold plate.

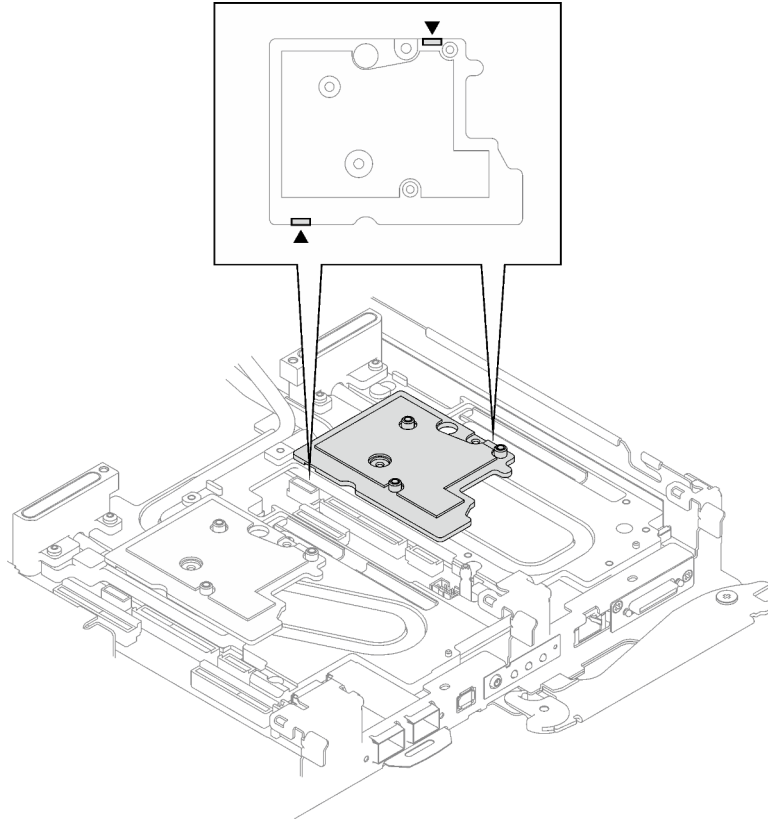


Figure 180. Locations of openings on the bottom side of the interface plate

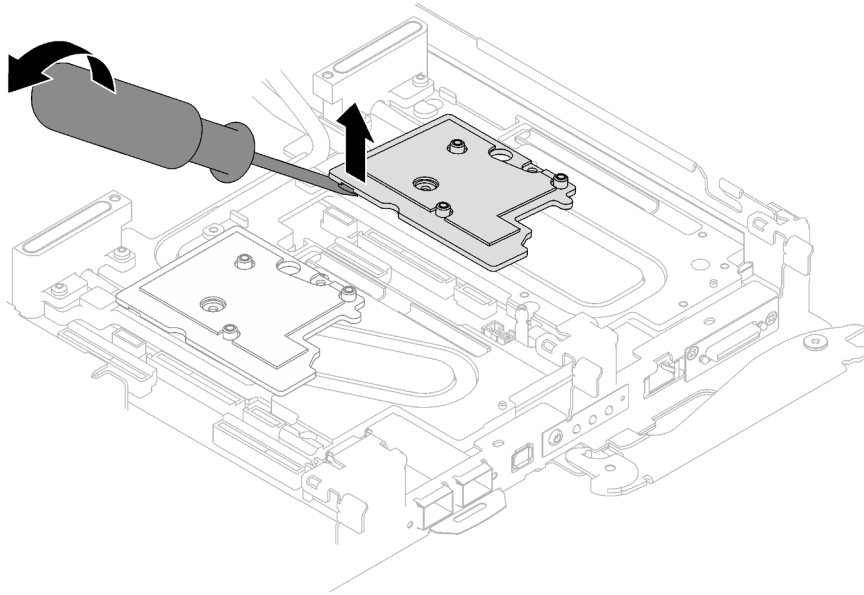


Figure 181. Releasing the interface plate from water loop cold plate

- c. Remove the interface plate from the tray.

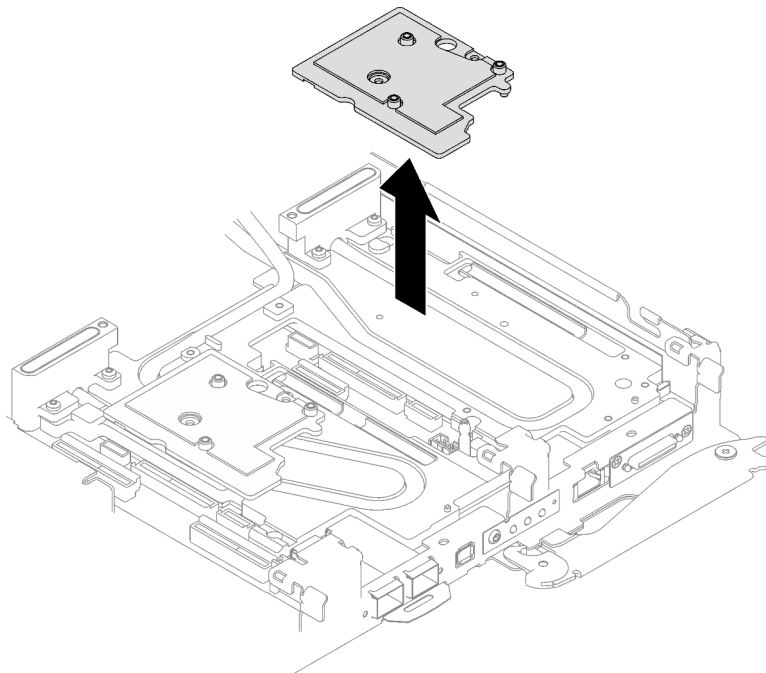


Figure 182. Removing the interface plate

Step 4. If necessary, install the blank bezel fillers.

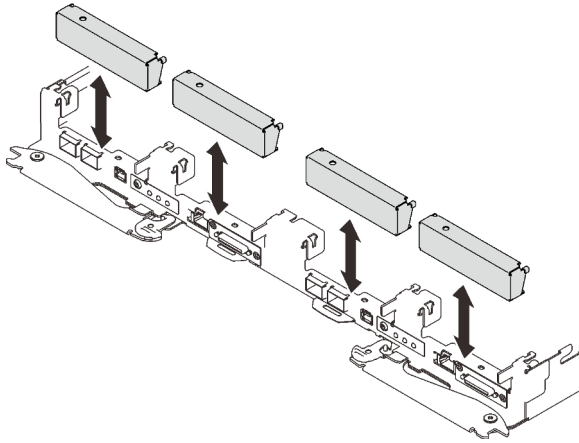


Figure 183. Blank bezel filler installation

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

If you need to disassemble the PCIe riser assembly, follow the instructions below:

Attention: You can only disassemble a PCIe riser assembly for recycle. Do not disassemble it for any other purposes.

1. Remove the two screws, then, separate the expansion board from the cage.

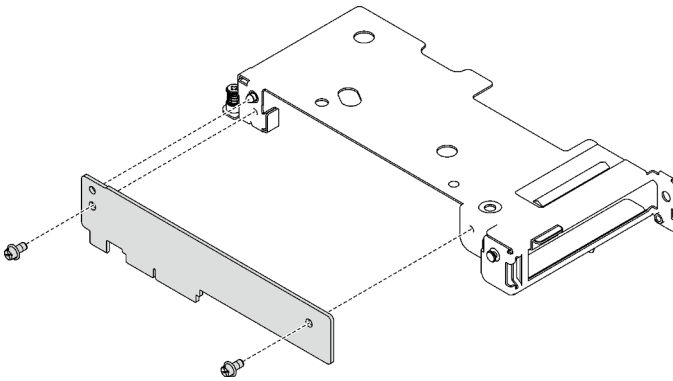


Figure 184. Expansion board removal

2. Recycle the unit in compliance with local regulations.

Install a PCIe riser assembly (ConnectX-7 NDR 400)

Use this information to install a PCIe riser assembly with ConnectX-7 NDR 400 adapter.

About this task

Required tools

Make sure you have the following kits at hand to properly replace the component:

- Miscellaneous parts kit

- CX7 NDR400 Thermal Kits (only damaged conduction plate needs to be replaced)
- ConnectX-7 NDR400 Putty pad kit

Important: Gap pad/putty pad replacement guidelines

- To identify the gap pad/putty pad location and orientation, see [“Gap pad/Putty pad identification and location” on page 40](#).
- Before replacing the gap pad/putty pad, gently clean the interface plate or the hardware surface with an alcohol cleaning pad.
- Hold the gap pad/putty pad carefully to avoid deformation. Make sure no screw hole or opening is blocked by the gap pad/putty pad material.
- Do not use expired putty pad. Check the expiry date on putty pad package. If the putty pads are expired, acquire new ones to properly replace them.

Attention:

- Read [“Installation Guidelines” on page 31](#) and [“Safety inspection checklist” on page 32](#) to ensure that you work safely.
- Turn off the corresponding DWC tray that you are going to perform the task on.
- Disconnect all external cables from the enclosure.
- Use extra force to disconnect QSFP cables if they are connected to the solution.

Note: For more information on selecting riser slot for PCIe riser installation, see [“PCIe adapter in compute node cable routing” on page 233](#).

Procedure

Step 1. Remove the blank bezel fillers if they are installed.

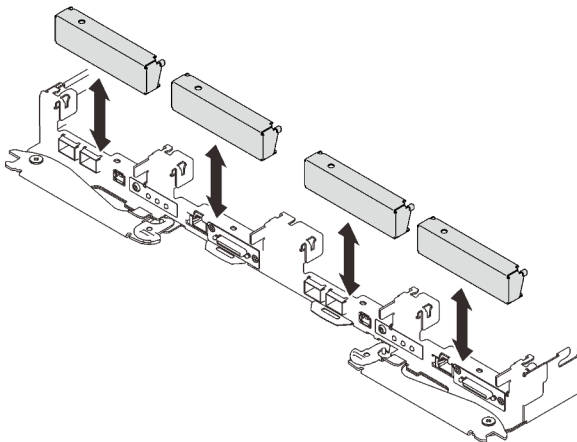


Figure 185. Blank bezel filler removal

Step 2. If the interface plate was removed, place the interface plate onto the node; then, secure the interface plate with two Phillips #2 screws.

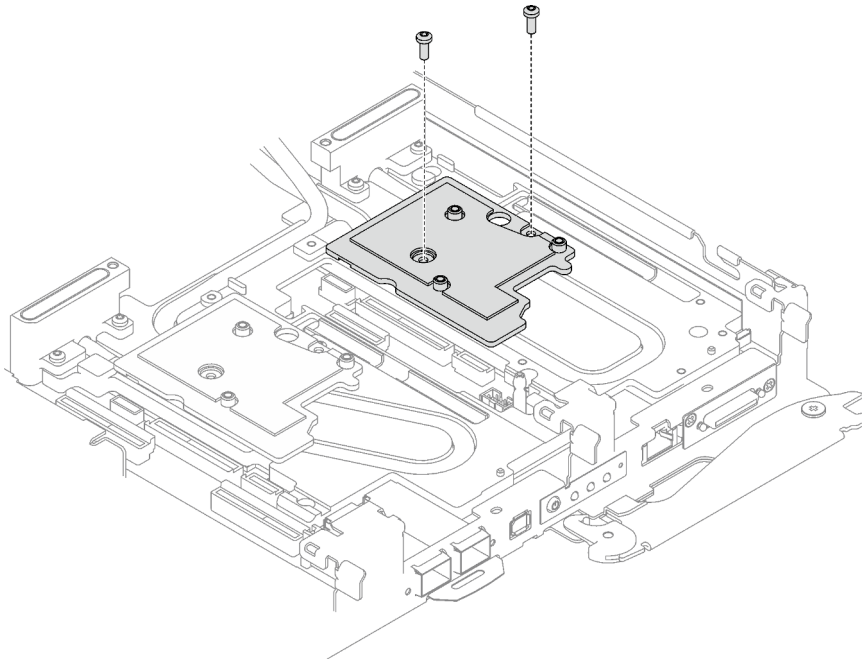


Figure 186. Interface plate installation

- Step 3. Replace the interface plate putty pad with a new one. Make sure to follow [Gap pad/putty pad replacement guidelines](#).

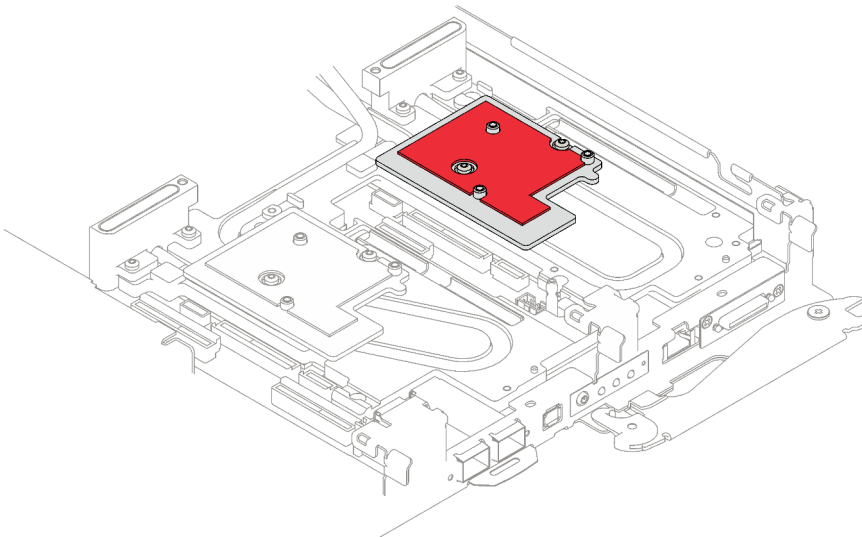


Figure 187. Gap pad on interface plate for CX-7 NDR 400

- Step 4. Install the PCIe riser assembly.
- a. ① Align the tab on the PCIe riser assembly with the slot on the front of the node; then, insert the PCIe riser assembly onto the system board.
 - b. ② Secure the riser assembly with three screws.
 - c. ③ Fasten the captive screw on the PCIe riser assembly.

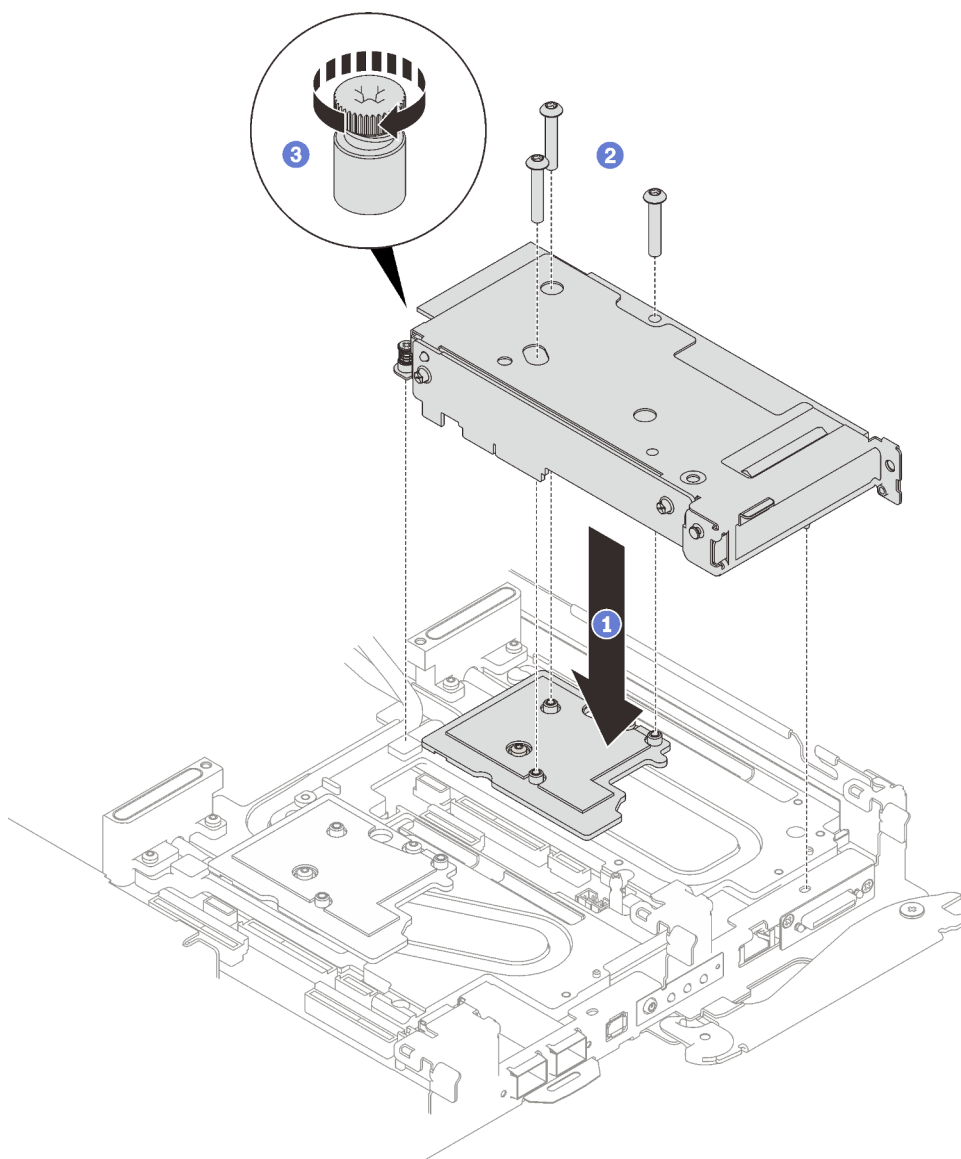


Figure 188. PCIe riser assembly installation

After you finish

1. For shared I/O or socket direct configurations, route the cables. See [Chapter 6 “Internal cable routing” on page 233](#) for cable routing details.
2. Install the tray cover. See [“Install the tray cover” on page 49](#).
3. Install the tray into the enclosure. See [“Install a DWC tray in the enclosure” on page 46](#).

Attention: Shared I/O configuration requires specific power on and power off sequence for the two nodes, see below:

- Power on sequence: first, power on the node with **main** adapter (right node); then, power on the node with **auxiliary** adapter (left node).
 - Power off sequence: first, power off the node with **auxiliary** adapter (left node); then, power off the node with **main** adapter (right node).
4. Connect all required external cables to the solution.

Note: Use extra force to connect QSFP cables to the solution.

5. Check the power LED on each node to make sure it changes from fast blink to slow blink to indicate all nodes are ready to be powered on.

Power distribution board replacement (trained technician only)

Use the following procedures to remove and install the power distribution board.

Remove the power distribution board

Use this information to remove the power distribution board.

About this task

Required tools

Make sure you have the required tools listed below in hand to properly replace the component.

- Water loop kits
 - SD650 V3 Water loop service kit
 - Conduction plate parts (only damaged parts need to be replaced)
 - M.2 Putty pad kit
- Drive gap pad or putty pad kits according to the drives installed in the tray. See their respective replacement procedures for more information.
- ConnectX series adapter putty pad kits according to the ConnectX adapter installed in the tray. See their respective replacement procedures for more information.
- Screws and screwdrivers

Prepare the following screwdrivers to ensure you can install and remove corresponding screws properly.

Screwdriver Type	Screw Type
Torx T10 head screwdriver	Torx T10 screw
Torx T30 head screwdriver	Torx T30 screw
Phillips #1 head screwdriver	Phillips #1 screw
Phillips #2 head screwdriver	Phillips #2 screw

Attention:

- Read [“Installation Guidelines” on page 31](#) and [“Safety inspection checklist” on page 32](#) to ensure that you work safely.
- Turn off the corresponding DWC tray that you are going to perform the task on.
- Disconnect all external cables from the enclosure.
- Use extra force to disconnect QSFP cables if they are connected to the solution.
- To avoid damaging the water loop, always use the water loop carrier when removing, installing or folding the water loop.

Procedure

Note: Depending on the model, your solution might look slightly different from the illustration.

Step 1. Make preparations for this task.

- a. Remove the tray from the enclosure. See [“Remove a DWC tray from the enclosure” on page 45](#).
- b. Remove the tray cover. See [“Remove the tray cover” on page 48](#).

- c. Remove the cross braces. See [“Remove the cross braces”](#) on page 50.
- d. Remove the DIMM comb. See [“Remove a DIMM comb”](#) on page 81.
- e. Remove memory modules. See [“Remove a memory module”](#) on page 141.
- f. Remove the M.2 backplane assembly. See [“Remove the M.2 backplane assembly”](#) on page 130.
- g. Remove the drive cage. See [“Remove a drive cage assembly”](#) on page 85.
- h. Remove the PCIe riser assembly. Depending on your configuration, see [“Remove a PCIe riser assembly \(ConnectX-6\)”](#) on page 156, [“PCIe riser assembly replacement \(ConnectX-7 NDR 200\)”](#) on page 165, or [“Remove a PCIe riser assembly \(ConnectX-7 NDR 400\)”](#) on page 175.

Step 2. Remove two Torx T10 screws (per node); then, remove the VR (voltage regulator) clamp plate out of the node.

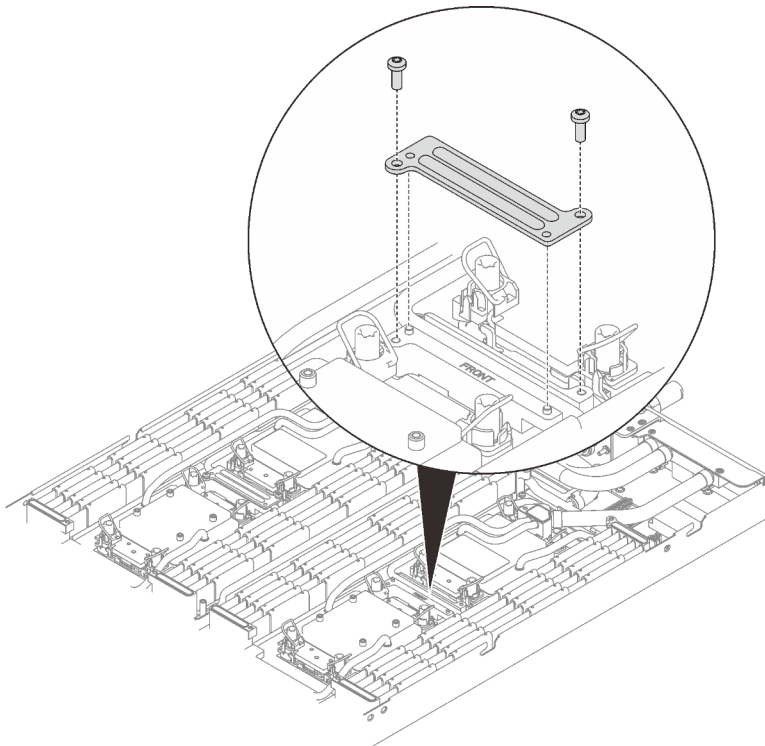


Figure 189. VR clamp plate removal

Step 3. Remove water loop screws (9x Torx T10 screws per node) with a torque screwdriver set to the proper torque.

Note: For reference, the torque required for the screws to be fully tightened/removed is 5.0+/- 0.5 lbf-in, 0.55+/- 0.05 N-M.

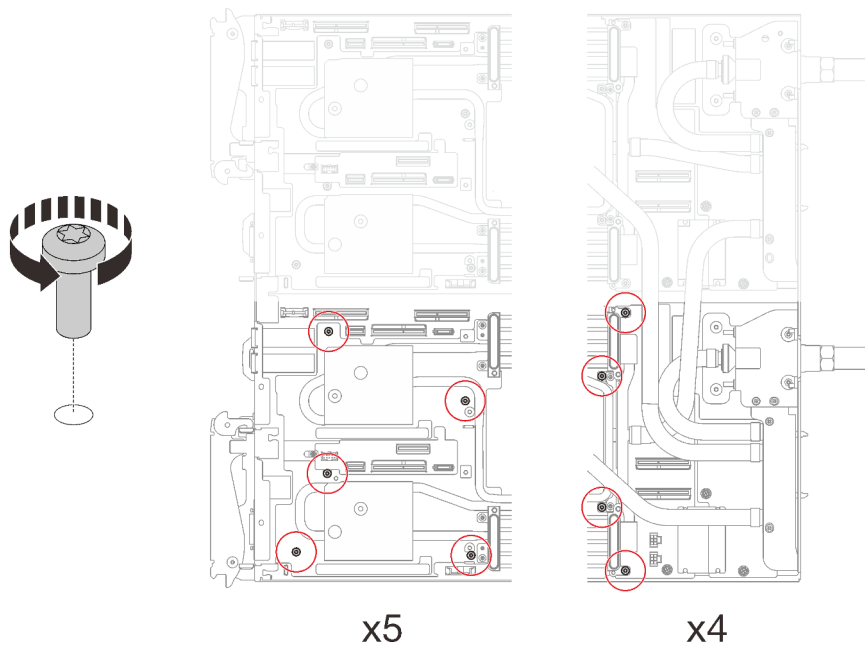


Figure 190. Water loop screw removal

Step 4. Remove the following screws to loosen the quick connect.

- Two Torx T10 screws (per node) on the quick connect.
- Five Torx T10 screws (per node) on the rear of the node.

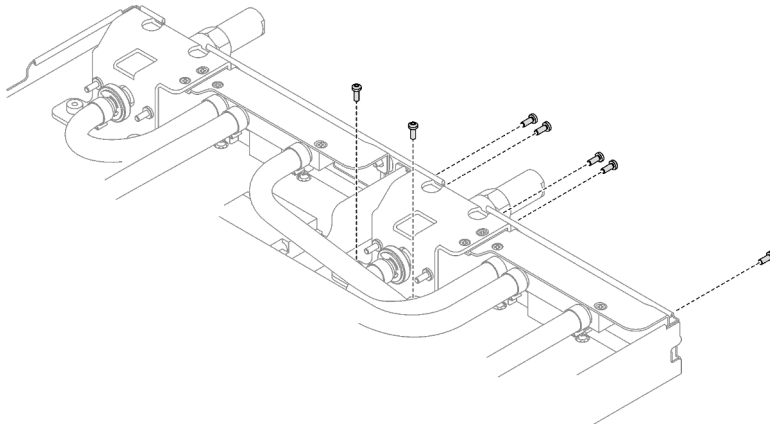


Figure 191. Quick connect screw removal

Step 5. Orient the water loop carrier with the guide pin; then, gently put the water loop carrier down and ensure it is seated firmly on the water loop.

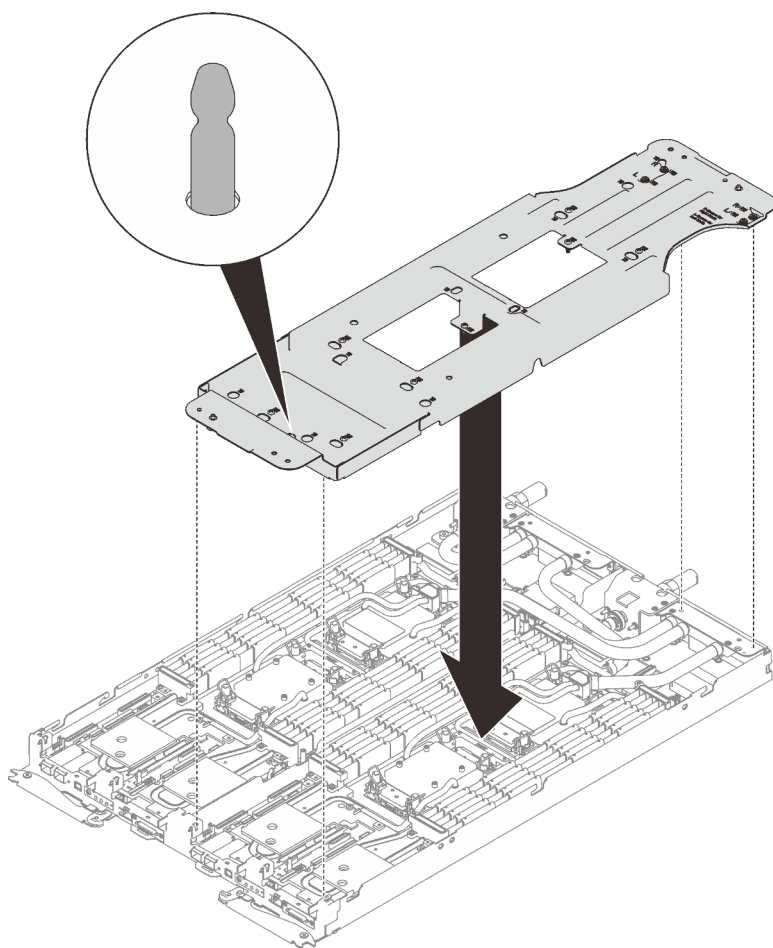


Figure 192. Water loop carrier installation

Step 6. Tighten water loop carrier screws (12x Phillips #2 screws per node).

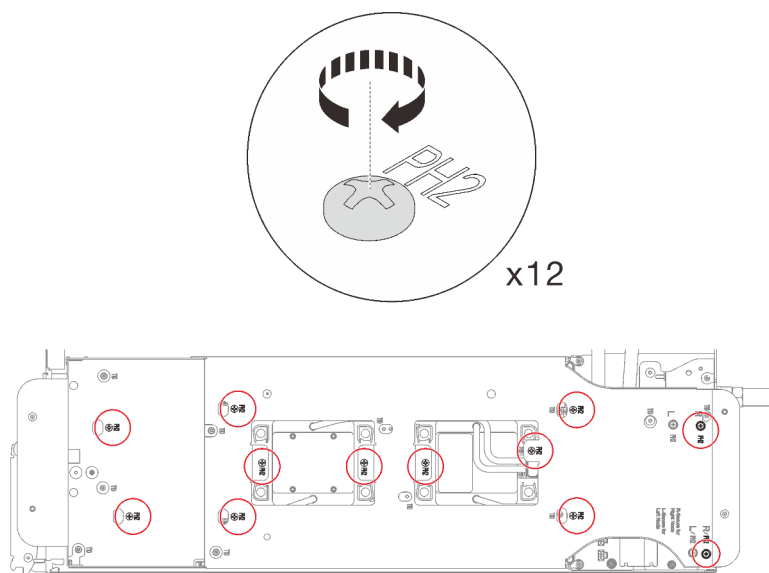


Figure 193. Water loop carrier screws installation

Step 7. Loosen processors properly.

1. ① Fully loosen all Torx T30 captive screws (8x Torx T30 captive screws per node) on cold plates with a general screwdriver until they stop, following the removal sequence shown on the cold plate label.

Note: For reference, the torque required for the screws to be fully tightened/removed is 10+/- 2.0 lbf-in, 1.1+/- 0.2 N-m.

Attention: To prevent damage to components, make sure that you follow the indicated loosening sequence.

2. ② Rotate all anti-tilt wire bails (8x anti-tilt wire bails per node) inwards to the unlocked position.

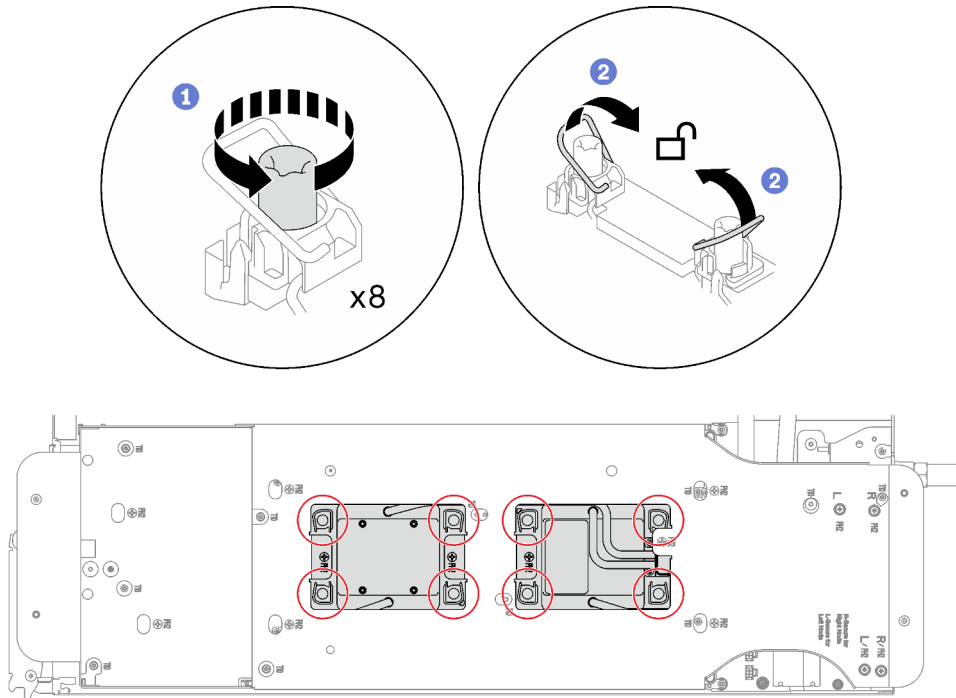


Figure 194. Loosening processors

Step 8. Carefully rotate the water loop so one half is sitting on top of the other half.

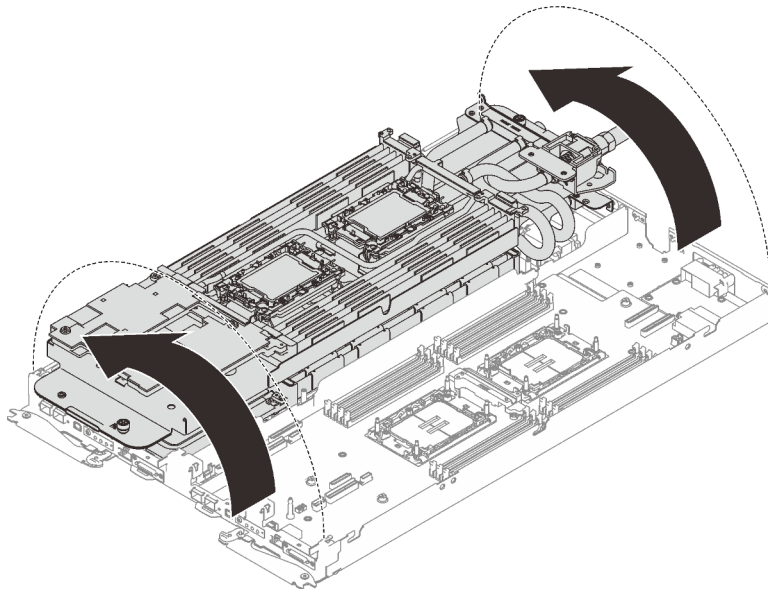


Figure 195. Folding the water loop

Step 9. Remove the power distribution board.

- a. ❶ Remove the five Phillips #1 screws (per node).
- b. ❷ Gently pull the power distribution board connector to disconnect it from the system board.
- c. ❸ Carefully pull the power distribution board inwards to disengage it from the node.

Note: Use a 3/16" hex head screwdriver to ensure the proper removal and installation.

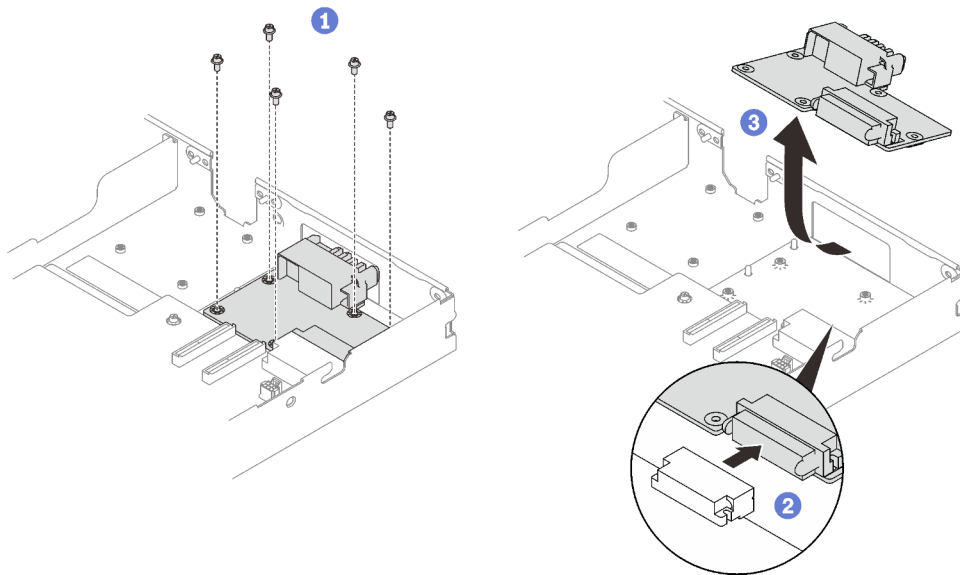


Figure 196. Power distribution board removal

After you finish

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

[Watch the procedure on YouTube](#)

Install the power distribution board

Use this information to install the power distribution board.

About this task

Required tools

Make sure you have the required tools listed below in hand to properly replace the component.

- Water loop kits
 - SD650 V3 Water loop service kit
 - Conduction plate parts (only damaged parts need to be replaced)
 - M.2 Putty pad kit
- Drive gap pad or putty pad kits according to the drives installed in the tray. See their respective replacement procedures for more information.
- ConnectX series adapter putty pad kits according to the ConnectX adapter installed in the tray. See their respective replacement procedures for more information.
- Screws and screwdrivers

Prepare the following screwdrivers to ensure you can install and remove corresponding screws properly.

Screwdriver Type	Screw Type
Torx T10 head screwdriver	Torx T10 screw
Torx T30 head screwdriver	Torx T30 screw
Phillips #1 head screwdriver	Phillips #1 screw
Phillips #2 head screwdriver	Phillips #2 screw

Important: Gap pad/putty pad replacement guidelines

- To identify the gap pad/putty pad location and orientation, see [“Gap pad/Putty pad identification and location” on page 40](#).
- Before replacing the gap pad/putty pad, gently clean the interface plate or the hardware surface with an alcohol cleaning pad.
- Hold the gap pad/putty pad carefully to avoid deformation. Make sure no screw hole or opening is blocked by the gap pad/putty pad material.
- Do not use expired putty pad. Check the expiry date on putty pad package. If the putty pads are expired, acquire new ones to properly replace them.

Attention:

- Read [“Installation Guidelines” on page 31](#) and [“Safety inspection checklist” on page 32](#) to ensure that you work safely.

Firmware and driver download: You might need to update the firmware or driver after replacing a component.

- Go to <https://datacentersupport.lenovo.com/products/servers/thinksystem/sd650v3/7d7m/downloads/driver-list/> to see the latest firmware and driver updates for your server.
- Go to [“Update the firmware” on page 239](#) for more information on firmware updating tools.

Procedure

Note: Depending on the model, your solution might look slightly different from the illustration.

Step 1. Install the power distribution board.

- a. ① Tilt the power distribution board and align it with the hole; then, slide it into place.
- b. ② Gently push the power distribution board connector to ensure it is connected to the system board.
- c. ③ Fasten the five Phillips #1 screws.

Note: Use a 3/16" hex head screwdriver to ensure the proper removal and installation.

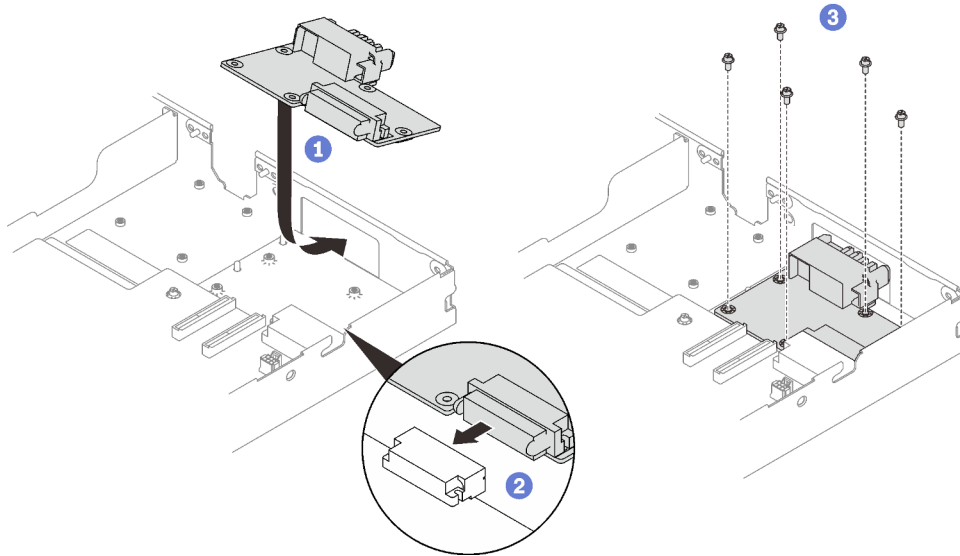


Figure 197. Power distribution board installation

Step 2. Check the gap pads on the water loop, if any of them are damaged or detached, replace them with the new ones.

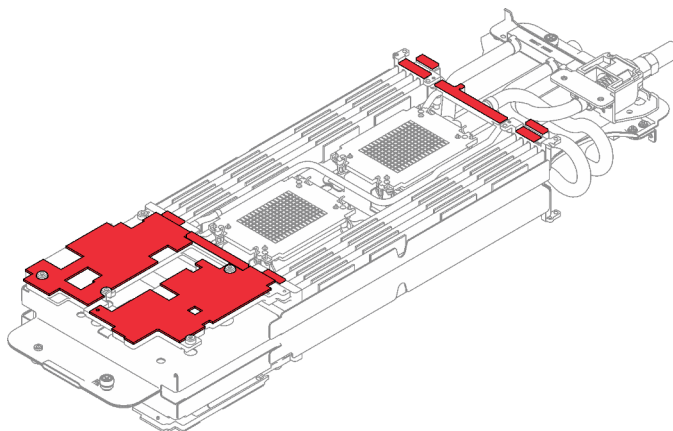


Figure 198. Water loop gap pads

Make sure to follow [Gap pad/putty pad replacement guidelines](#).

- Step 3. Carefully rotate the top side of the water loop, position the water loop on the two guide pins near the rear of the node; then, gently put the water loop down and ensure it is firmly seated on the system board.

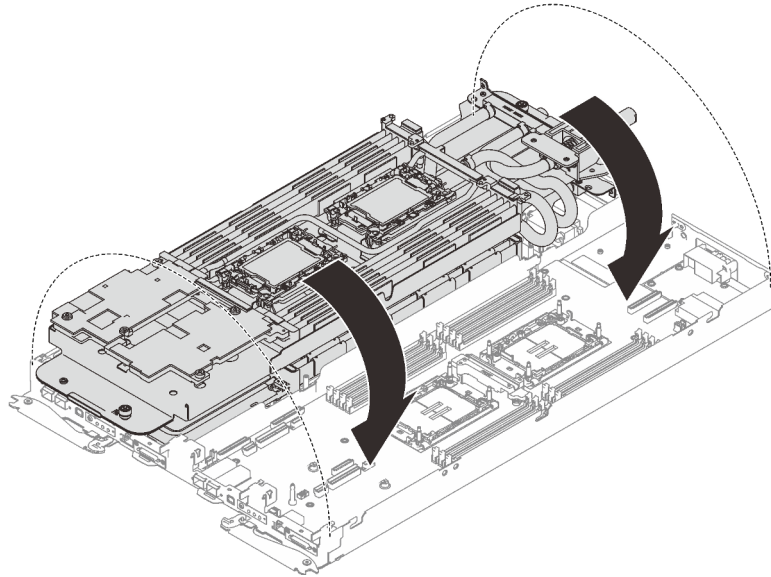


Figure 199. Water loop installation

- Step 4. Ensure the processors are secured properly.
- 1 Rotate the anti-tilt wire bails (8x anti-tilt wire bails per node) outwards to the locked position.
 - 2 Fully tighten all Torx T30 captive screws (8x Torx T30 captive screws per node) on cold plates with a general screwdriver until they stop, following the installation sequence shown on the cold plate label.

Note: For reference, the torque required for the screws to be fully tightened/removed is 10+/- 2.0 lbf-in, 1.1+/- 0.2 N-m.

Attention: To prevent damage to components, make sure that you follow the indicated tightening sequence.

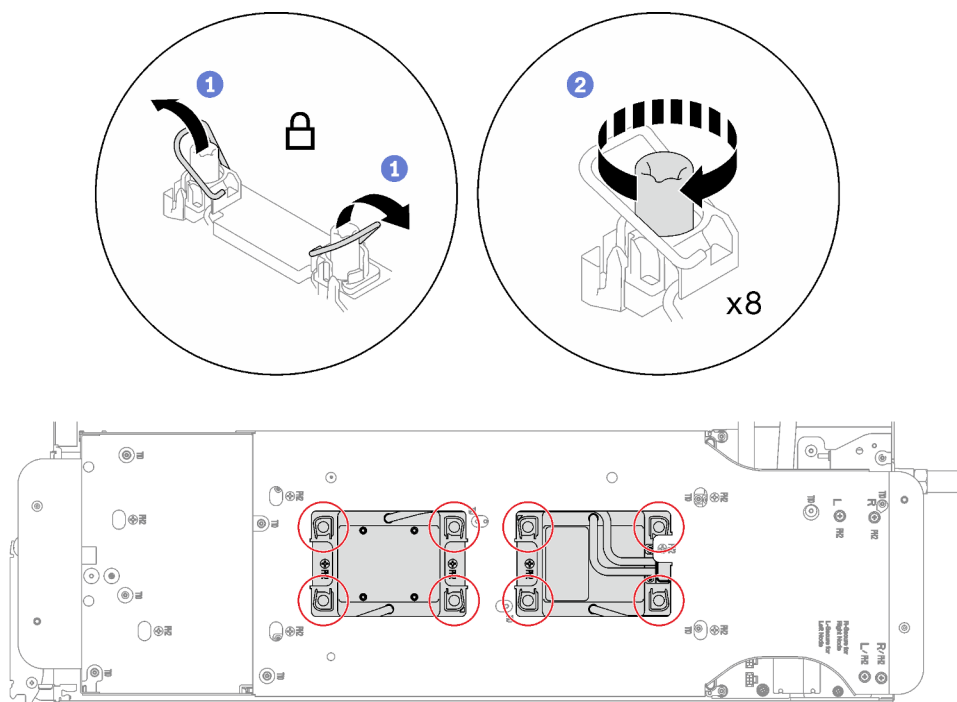


Figure 200. Processors installation

Step 5. Loosen water loop carrier screws (12x Phillips #2 screws per node).

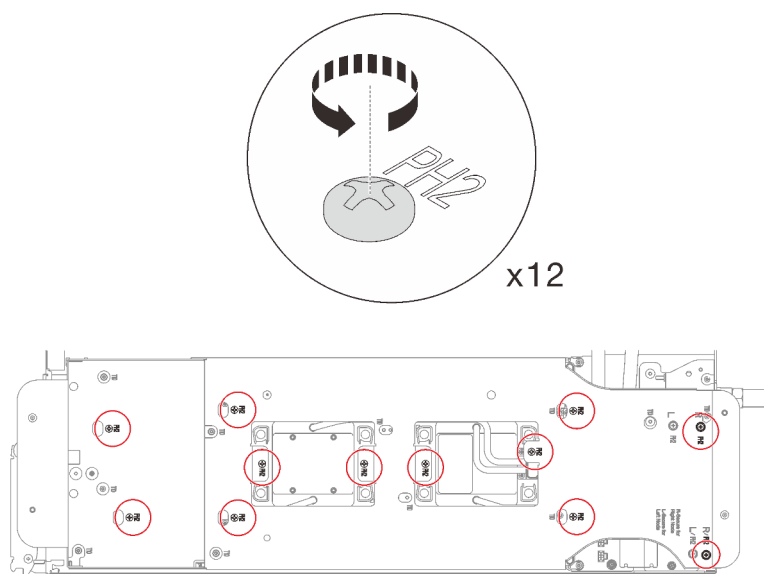


Figure 201. Loosening water loop carrier screws

Step 6. Carefully lift the water loop carrier up and away from the water loop.

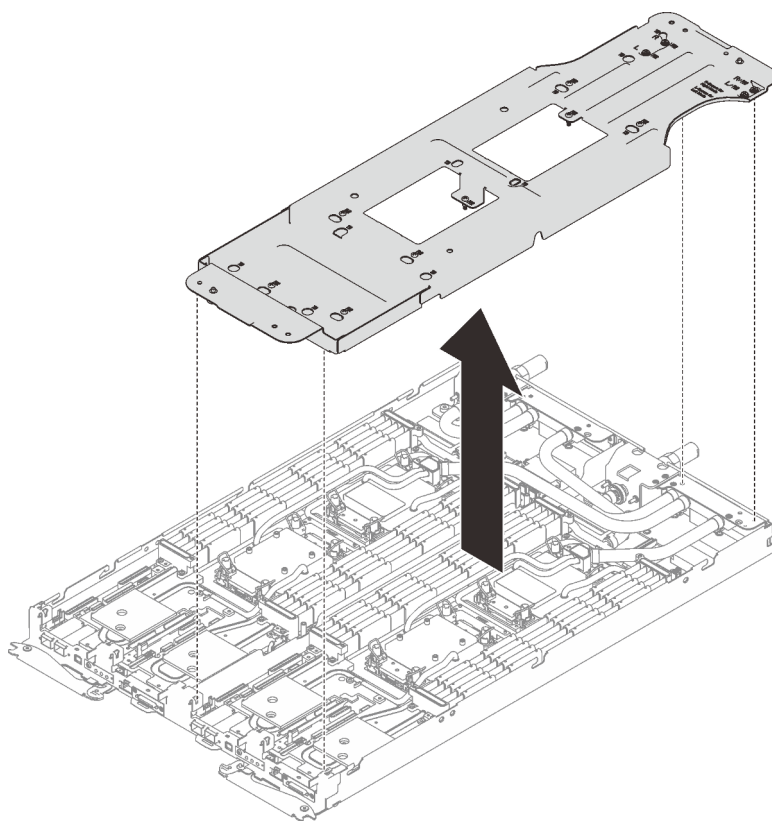


Figure 202. Water loop carrier removal

Step 7. Install water loop screws (9x Torx T10 screws per node) with a torque screwdriver set to the proper torque.

Note: For reference, the torque required for the screws to be fully tightened/removed is 5.0+/- 0.5 lbf-in, 0.55+/- 0.05 N-M.

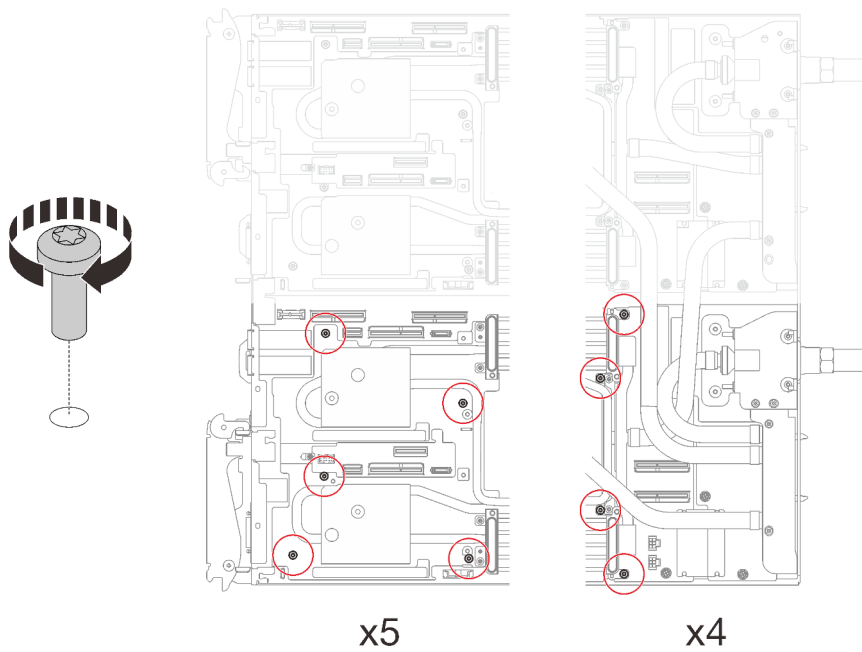


Figure 203. Water loop screws installation

Step 8. Install the following screws to secure the quick connect.

- Two Torx T10 screws (per node) on the quick connect.
- Five Torx T10 screws (per node) on the rear of the node.

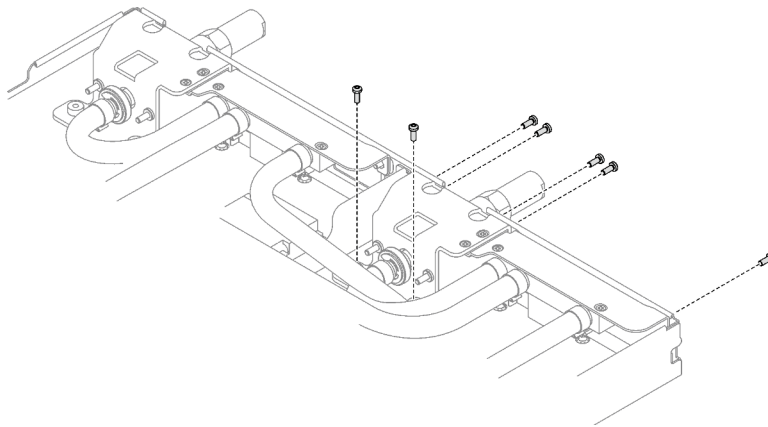


Figure 204. Quick connect screw installation

Step 9. Install the VR clamp plate into the node and install Torx T10 screws (2x Torx T10 screw per nodes).

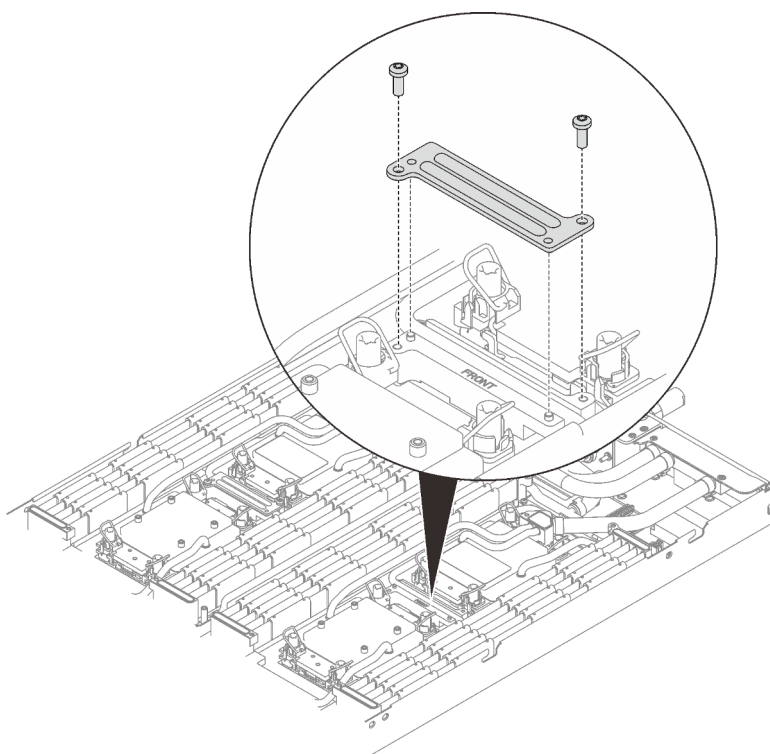


Figure 205. VR clamp plate installation

After you finish

1. Install the memory modules. See [“Install a memory module”](#) on page 146.
2. Install the DIMM comb. See [“Install a DIMM comb”](#) on page 83.
3. Install the M.2 backplane assembly. See [“Install the M.2 backplane assembly”](#) on page 134.
4. Install the drive cage. See [“Install a drive cage assembly”](#) on page 95.
5. Install the PCIe riser assembly. See [“Install a PCIe riser assembly \(ConnectX-6\)”](#) on page 160 , [“PCIe riser assembly replacement \(ConnectX-7 NDR 200\)”](#) on page 165, or [“Install a PCIe riser assembly \(ConnectX-7 NDR 400\)”](#) on page 181.
6. Install the cross braces. See [“Install the cross braces”](#) on page 52.
7. Install the tray cover. See [“Install the tray cover”](#) on page 49.
8. Install the tray into the enclosure. See [“Install a DWC tray in the enclosure”](#) on page 46.
9. Connect all required external cables to the solution.

Note: Use extra force to connect QSFP cables to the solution.

10. Check the power LED on each node to make sure it changes from fast blink to slow blink to indicate all nodes are ready to be powered on.

Demo video

[Watch the procedure on YouTube](#)

Processor replacement (trained technician only)

Use the following procedures to replace an assembled processor.

Attention: Before you begin replacing a processor, make sure that you use Lenovo proven alcohol cleaning pad and thermal grease.

Important: The processor in your solution can throttle in response to thermal conditions, temporarily lowering its speed to reduce heat output. In instances where a few processor cores are throttled for an extremely short time period (100 ms or less), the only indication might be an entry in the operating system event log with no corresponding entry in the system XCC event log. If this situation occurs, the event can be ignored and processor replacement is not required.

Remove a processor

This task has instructions for removing an assembled processor. This task requires a Torx T30 driver.

About this task

Required tools

Make sure you have the required tools listed below in hand to properly replace the component.

- Water loop kits
 - SD650 V3 Water loop service kit
 - Conduction plate parts (only damaged parts need to be replaced)
 - M.2 Putty pad kit
- Drive gap pad or putty pad kits according to the drives installed in the tray. See their respective replacement procedures for more information.
- ConnectX series adapter putty pad kits according to the ConnectX adapter installed in the tray. See their respective replacement procedures for more information.
- Screws and screwdrivers

Prepare the following screwdrivers to ensure you can install and remove corresponding screws properly.

Screwdriver Type	Screw Type
Torx T10 head screwdriver	Torx T10 screw
Torx T30 head screwdriver	Torx T30 screw
Phillips #1 head screwdriver	Phillips #1 screw
Phillips #2 head screwdriver	Phillips #2 screw

Attention:

- Read [“Installation Guidelines” on page 31](#) and [“Safety inspection checklist” on page 32](#) to ensure that you work safely.
- To transfer Intel® On Demand Suite from the defective processor to the new processor, read the PPIN of the defective processor before powering off the system. For more information, see [“Enable Intel® On Demand” on page 247](#).
- Turn off the corresponding DWC tray that you are going to perform the task on.
- Disconnect all external cables from the enclosure.
- Use extra force to disconnect QSFP cables if they are connected to the solution.
- Each processor socket must always contain a cover. When removing or installing a processor, protect empty processor sockets with a cover.

- Do not touch the processor socket or processor contacts. Processor-socket contacts are very fragile and easily damaged. Contaminants on the processor contacts, such as oil from your skin, can cause connection failures.
- Do not allow the thermal grease on the processor or water loop to come in contact with anything. Contact with any surface can compromise the thermal grease, rendering it ineffective. Thermal grease can damage components, such as electrical connectors in the processor socket. Do not remove the grease cover from the cold plate until you are instructed to do so.
- Before you install a new or replace a processor, update your system firmware to the latest level. See [“Update the firmware” on page 239](#).
- To avoid damaging the water loop, always use the water loop carrier when removing, installing or folding the water loop.

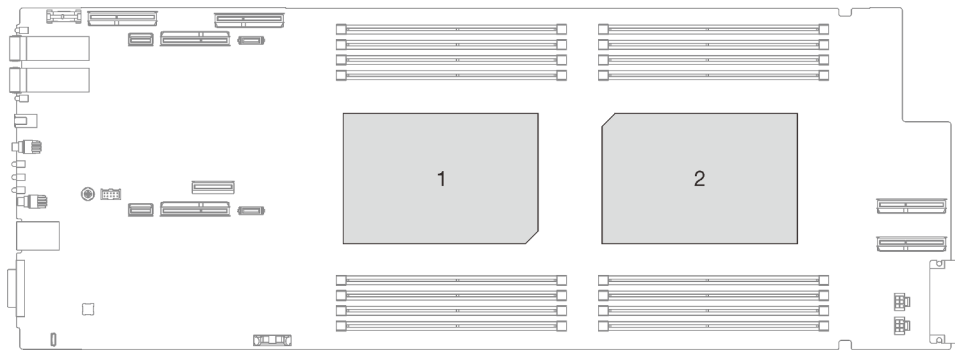


Figure 206. Processor locations

Procedure

Note: Depending on the model, your solution might look slightly different from the illustration.

Step 1. Make preparations for this task.

- Remove the tray from the enclosure. See [“Remove a DWC tray from the enclosure” on page 45](#).
- Remove the tray cover. See [“Remove the tray cover” on page 48](#).
- Remove the cross braces. See [“Remove the cross braces” on page 50](#).
- Remove the DIMM comb. See [“Remove a DIMM comb” on page 81](#).
- Remove memory modules. See [“Remove a memory module” on page 141](#).
- Remove the M.2 backplane assembly. See [“Remove the M.2 backplane assembly” on page 130](#).
- Remove the drive cage. See [“Remove a drive cage assembly” on page 85](#).
- Remove the PCIe riser assembly. Depending on your configuration, see [“Remove a PCIe riser assembly \(ConnectX-6\)” on page 156](#), [“PCIe riser assembly replacement \(ConnectX-7 NDR 200\)” on page 165](#), or [“Remove a PCIe riser assembly \(ConnectX-7 NDR 400\)” on page 175](#).

Step 2. Remove two Torx T10 screws (per node); then, remove the VR (voltage regulator) clamp plate out of the node.

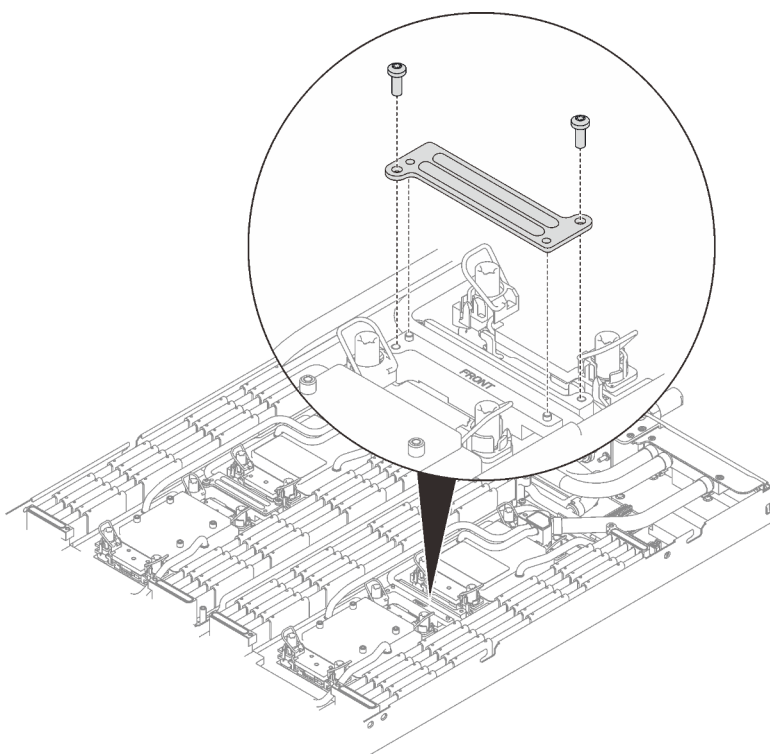


Figure 207. VR clamp plate removal

Step 3. Remove water loop screws (9x Torx T10 screws per node) with a torque screwdriver set to the proper torque.

Note: For reference, the torque required for the screws to be fully tightened/removed is 5.0+/- 0.5 lbf-in, 0.55+/- 0.05 N-M.

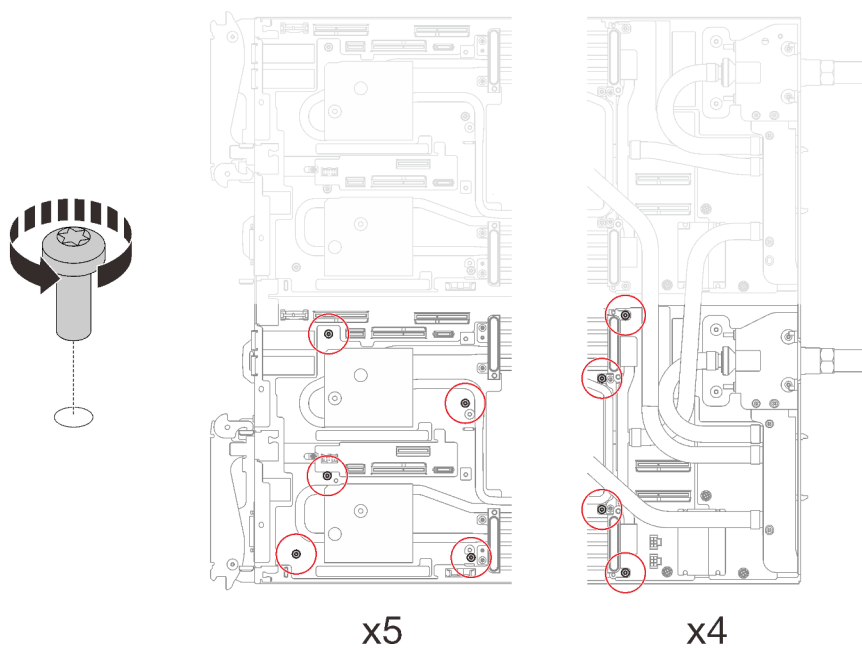


Figure 208. Water loop screw removal

Step 4. Remove the following screws to loosen the quick connect.

- Two Torx T10 screws (per node) on the quick connect.
- Five Torx T10 screws (per node) on the rear of the node.

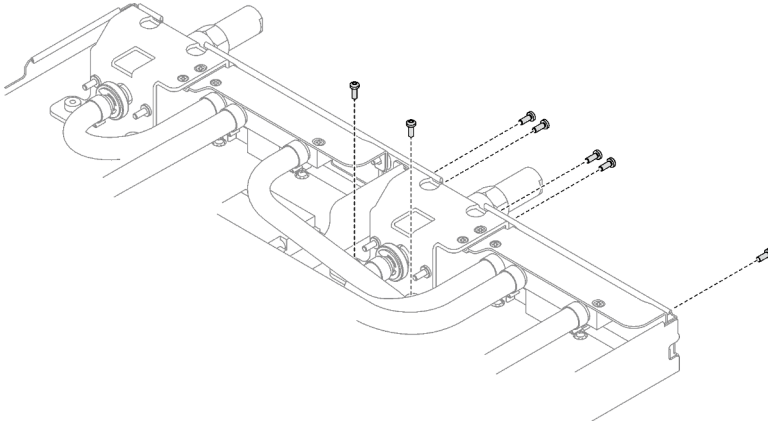


Figure 209. Quick connect screw removal

Step 5. Orient the water loop carrier with the guide pin; then, gently put the water loop carrier down and ensure it is seated firmly on the water loop.

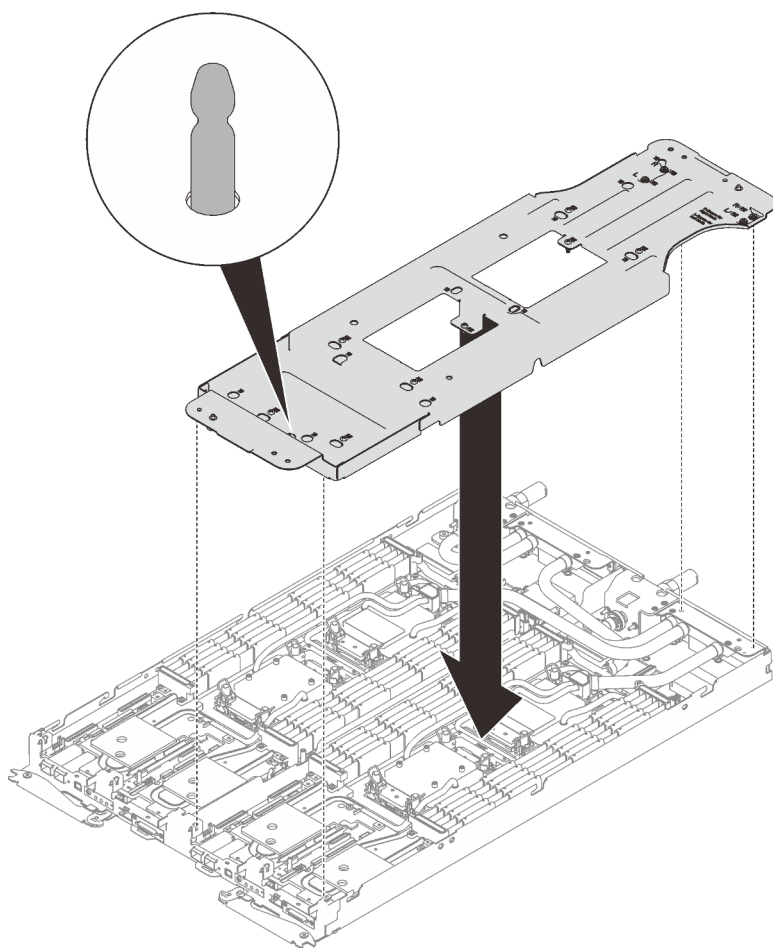


Figure 210. Water loop carrier installation

Step 6. Tighten water loop carrier screws (12x Phillips #2 screws per node).

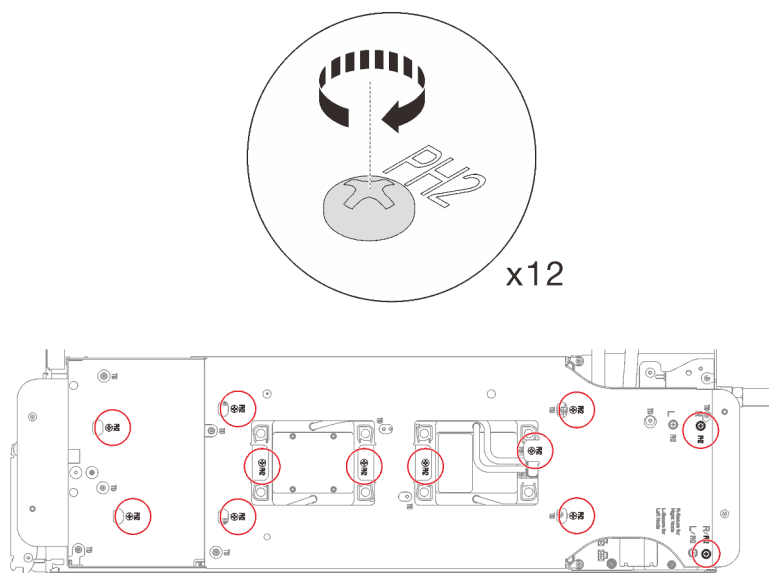


Figure 211. Water loop carrier screws installation

Step 7. Loosen processors properly.

1. ① Fully loosen all Torx T30 captive screws (8x Torx T30 captive screws per node) on cold plates with a general screwdriver until they stop, following the removal sequence shown on the cold plate label.

Note: For reference, the torque required for the screws to be fully tightened/removed is 10+/- 2.0 lbf-in, 1.1+/- 0.2 N-m.

Attention: To prevent damage to components, make sure that you follow the indicated loosening sequence.

2. ② Rotate all anti-tilt wire bails (8x anti-tilt wire bails per node) inwards to the unlocked position.

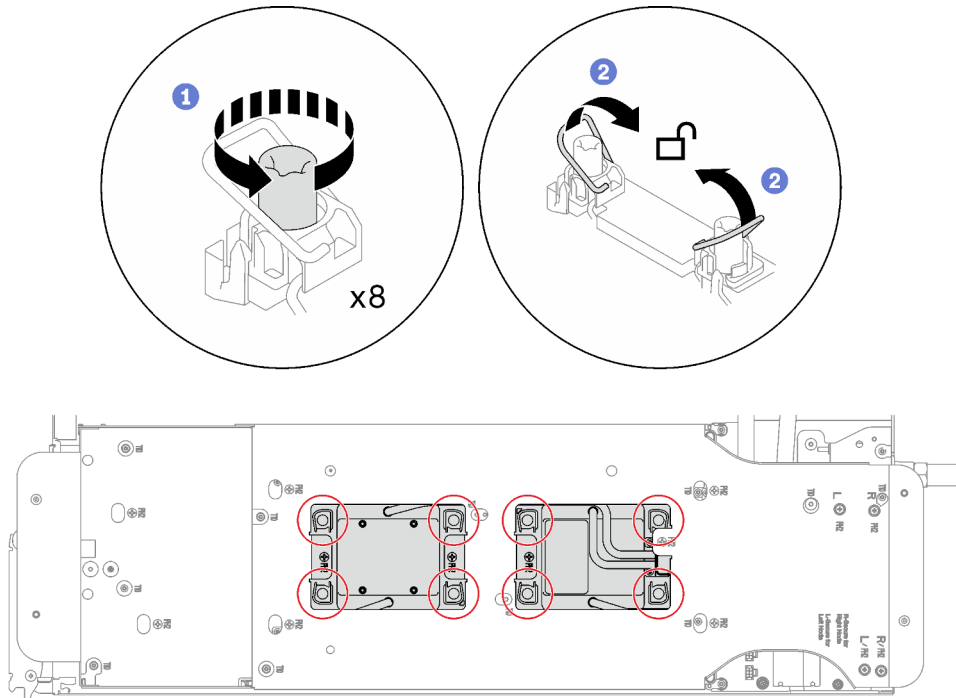


Figure 212. Loosening processors

Step 8. Carefully rotate the water loop so one half is sitting on top of the other half.

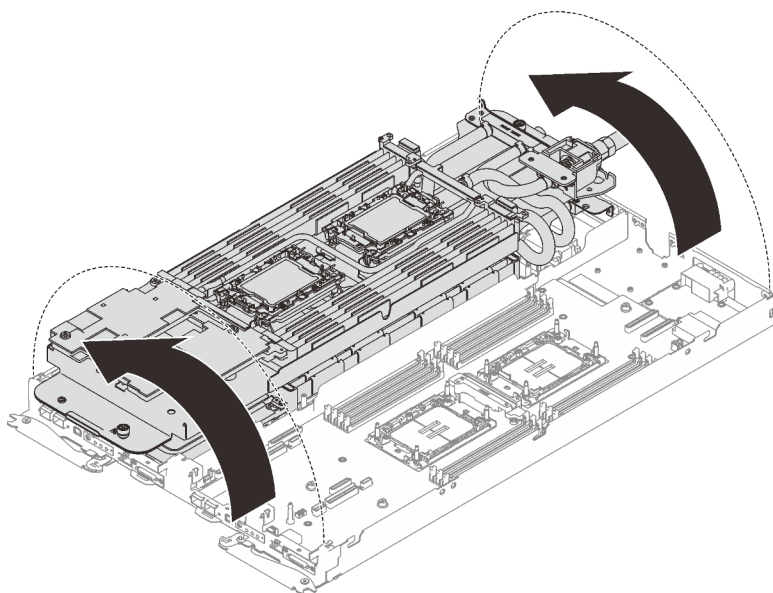


Figure 213. Folding the water loop

Step 9. Remove the processor from the retainer. This process differs by processor SKU. Check the processor SKU and follow the applicable procedure.

Note: Do not touch the contacts on the processor.

For non Intel® Xeon® CPU Max processor

1. ① Lift the handle to release the processor from the retainer.
2. ② Carefully hold the processor by its edges; then, lift the processor from the retainer.

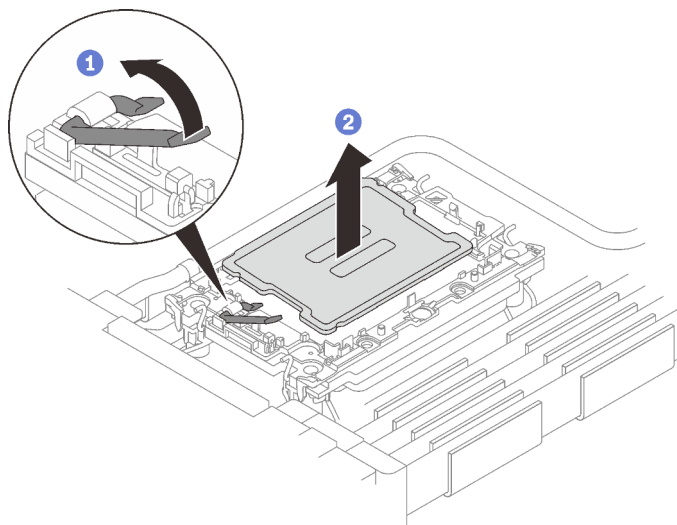


Figure 214. Processor removal

For Intel® Xeon® CPU Max processor

1. ① Insert a flat head screwdriver into the TIM breaking cam on the retainer; then, slightly rotate the flat head screwdriver to release the processor from the retainer.
2. ② Carefully hold the processor by its edges; then, lift the processor from the retainer.

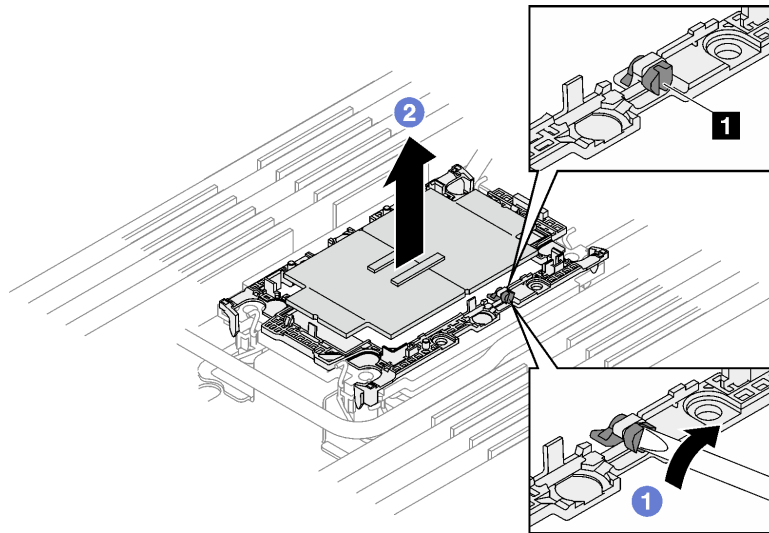


Figure 215. Processor removal (Intel® Xeon® CPU Max processor)

1 TIM breaking cam

Step 10. Without putting the processor down, wipe the thermal grease from the top of the processor with an alcohol cleaning pad; then, place the processor on a static protective surface with the processor-contact side up.

Step 11. Remove the processor retainer from the underside of the cold plate.

Note: The processor retainer will be discarded and replaced with a new one.

- a. 1 Carefully release the retaining clips from the cold plate.
- b. 2 Lift the retainer from the cold plate.

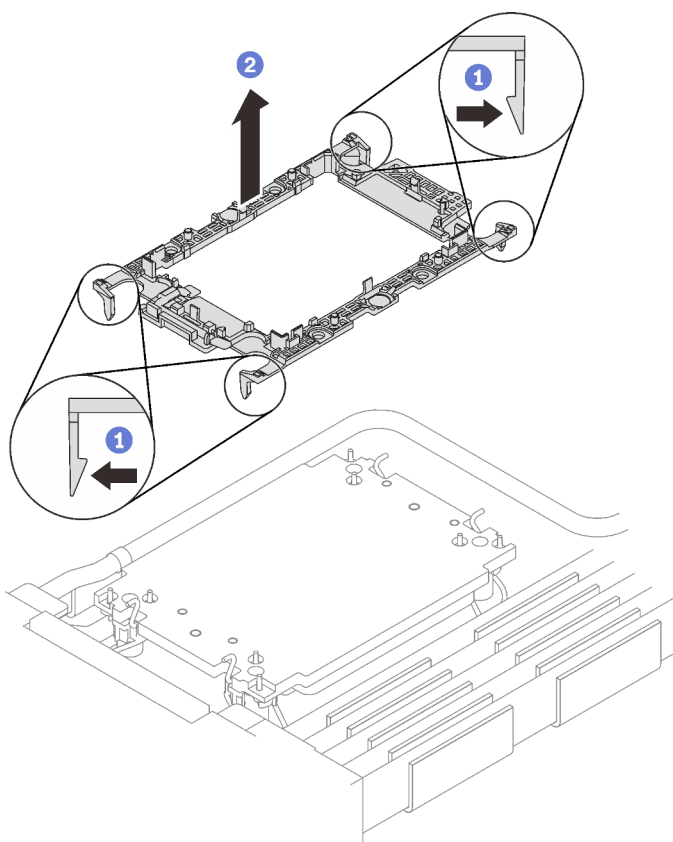


Figure 216. Processor retainer removal

Step 12. Wipe the thermal grease from the bottom of the cold plate with an alcohol cleaning pad.

After you finish

- If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.
- To transfer Intel® On Demand Suite from the defective processor to the new processor, see [“Enable Intel® On Demand” on page 247](#).

Demo video

[Watch the procedure on YouTube](#)

Install a processor

This task has instructions for installing a processor. This task requires a Torx T30 driver.

About this task

Required tools

Make sure you have the required tools listed below in hand to properly replace the component.

- Water loop kits
 - SD650 V3 Water loop service kit
 - Conduction plate parts (only damaged parts need to be replaced)
 - M.2 Putty pad kit
- Drive gap pad or putty pad kits according to the drives installed in the tray. See their respective replacement procedures for more information.
- ConnectX series adapter putty pad kits according to the ConnectX adapter installed in the tray. See their respective replacement procedures for more information.
- Screws and screwdrivers

Prepare the following screwdrivers to ensure you can install and remove corresponding screws properly.

Screwdriver Type	Screw Type
Torx T10 head screwdriver	Torx T10 screw
Torx T30 head screwdriver	Torx T30 screw
Phillips #1 head screwdriver	Phillips #1 screw
Phillips #2 head screwdriver	Phillips #2 screw

Important: Gap pad/putty pad replacement guidelines

- To identify the gap pad/putty pad location and orientation, see [“Gap pad/Putty pad identification and location” on page 40](#).
- Before replacing the gap pad/putty pad, gently clean the interface plate or the hardware surface with an alcohol cleaning pad.
- Hold the gap pad/putty pad carefully to avoid deformation. Make sure no screw hole or opening is blocked by the gap pad/putty pad material.
- Do not use expired putty pad. Check the expiry date on putty pad package. If the putty pads are expired, acquire new ones to properly replace them.

Attention:

- Read [“Installation Guidelines” on page 31](#) and [“Safety inspection checklist” on page 32](#) to ensure that you work safely.
- To transfer Intel® On Demand Suite from the defective processor to the new processor, read the PPIN of the defective processor before powering off the system. For more information, see [“Enable Intel® On Demand” on page 247](#).
- Turn off the corresponding DWC tray that you are going to perform the task on.
- Disconnect all external cables from the enclosure.
- Use extra force to disconnect QSFP cables if they are connected to the solution.
- Each processor socket must always contain a cover. When removing or installing a processor, protect empty processor sockets with a cover.

- Do not touch the processor socket or processor contacts. Processor-socket contacts are very fragile and easily damaged. Contaminants on the processor contacts, such as oil from your skin, can cause connection failures.
- Do not allow the thermal grease on the processor or water loop to come in contact with anything. Contact with any surface can compromise the thermal grease, rendering it ineffective. Thermal grease can damage components, such as electrical connectors in the processor socket. Do not remove the grease cover from the cold plate until you are instructed to do so.
- Before you install a new or replace a processor, update your system firmware to the latest level. See [“Update the firmware” on page 239](#).
- To avoid damaging the water loop, always use the water loop carrier when removing, installing or folding the water loop.

Notes:

- See <https://serverproven.lenovo.com> for a list of processors supported for your system. All processors on the system board must have the same speed, number of cores, and frequency.
- Optional devices available for your system might have specific processor requirements. See the documentation that comes with the optional device for information.

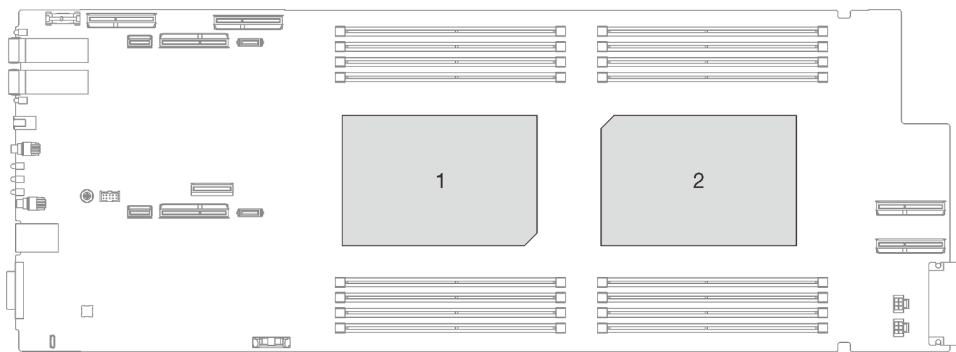


Figure 217. Processor locations

Firmware and driver download: You might need to update the firmware or driver after replacing a component.

- Go to <https://datacentersupport.lenovo.com/products/servers/thinksystem/sd650v3/7d7m/downloads/driver-list/> to see the latest firmware and driver updates for your server.
- Go to [“Update the firmware” on page 239](#) for more information on firmware updating tools.

Procedure

Note: Depending on the model, your solution might look slightly different from the illustration.

Step 1. Follow the following steps if you are replacing processors:

- If there is any old thermal grease on the processor and the cold plate, gently clean the top of the processor and the cold plate using an alcohol cleaning pad.
- Remove the processor identification label from the water loop and replace it with the new label that comes with the replacement processor. If you are unable to remove the label and place it on the new water loop, or if the label is damaged during transfer, write the processor serial number from the processor identification label on the new water loop in the same location as the label would be placed using a permanent marker.
- Apply the thermal grease on the top of the processor with syringe by forming four uniformly spaced dots, while each dot consists of about 0.1 ml of thermal grease

Note: Carefully place the processor and retainer on a flat surface with the processor-contact side down.

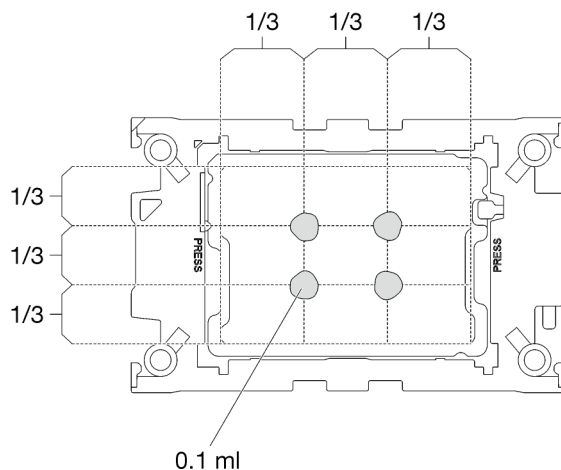


Figure 218. Thermal grease application

Step 2. Install processor retainers onto processor if needed.

- a. Align the triangular mark on the processor retainer with the triangular mark on the processor corner edge.
- b. **(Intel® Xeon® CPU Max only)** Make sure the slot on the TIM breaking cam is vertical. See Figure 4.
- c. Gently place the processor retainer on the processor; then, carefully press the four sides of the processor retainer to secure the processor.

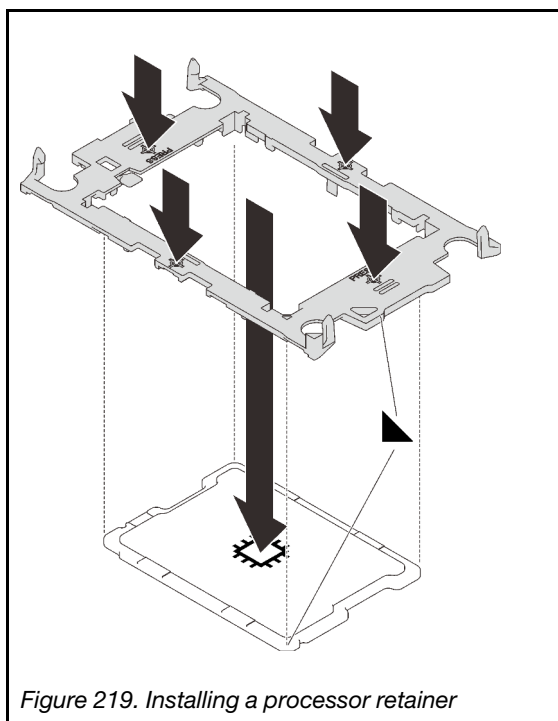


Figure 219. Installing a processor retainer

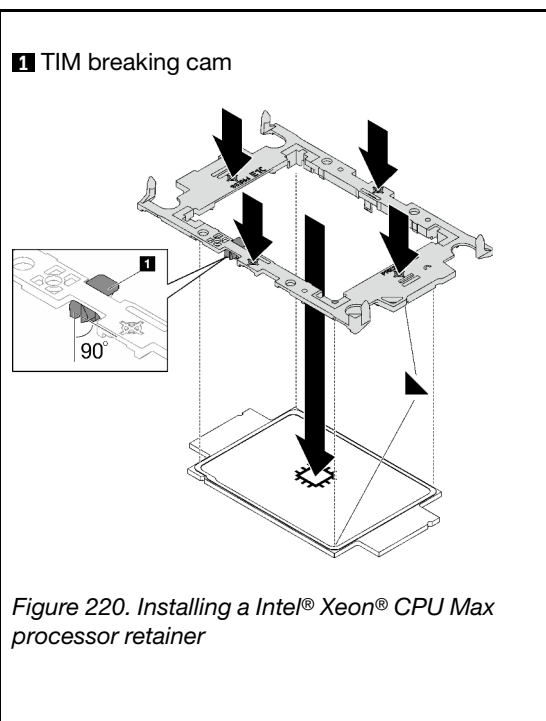


Figure 220. Installing a Intel® Xeon® CPU Max processor retainer

- d. **(Intel® Xeon® CPU Max only)** After installing the retainer onto processor, make sure the slot on the TIM breaking cam is vertical.

1 TIM breaking cam

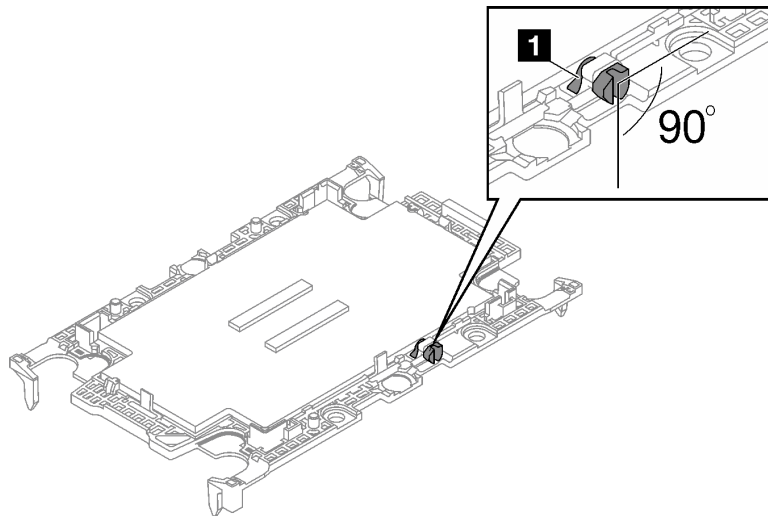


Figure 221. TIM breaking cam on processor retainer

Step 3. Remove two plastic grease covers if needed.

- a. 1 Use a pair of scissors to cut off the tape.
- b. 2 Remove plastic grease covers from the underside of water loop cold plates.

Note: The right node is shown as example. Remove plastic grease covers if needed when installing processor in either node.

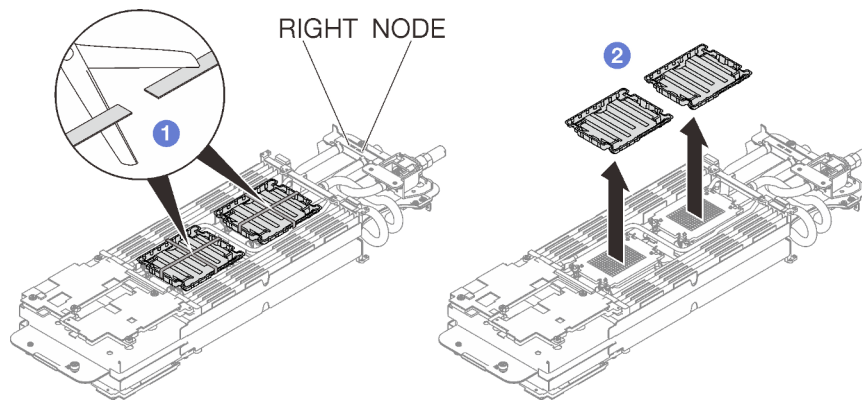


Figure 222. Plastic grease covers removal

Step 4. Align the triangular marks on the processor retainers with the triangular slots on the underside of the water loop cold plate; then, attach the processors to the underside of the water loop cold plate by inserting the processor retainer posts and clips features into the openings at the four corners of the cold plate.

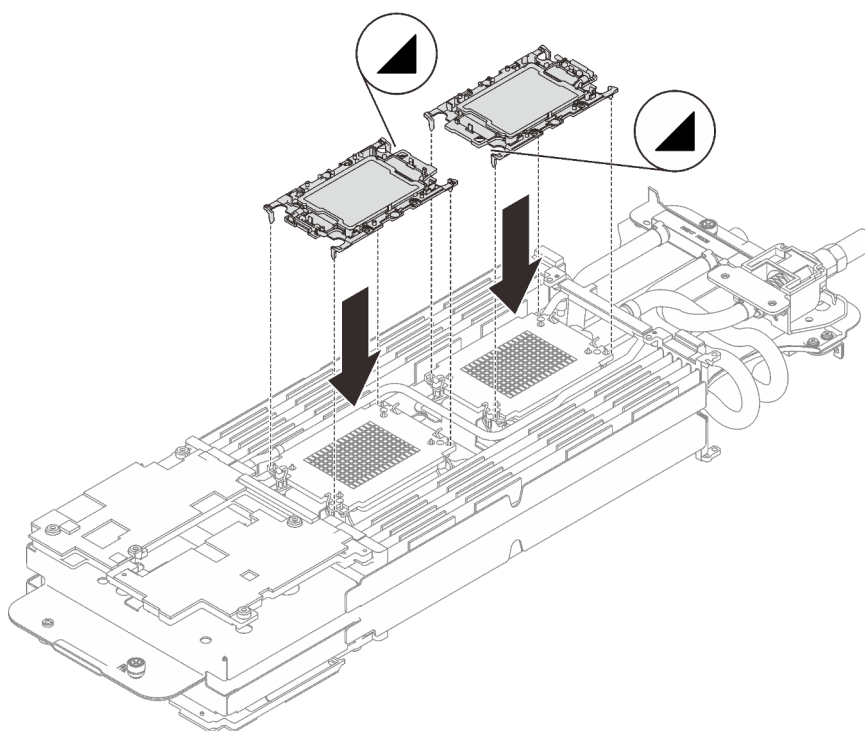


Figure 223. Processor installation

Step 5. Rotate all anti-tilt wire bails (8x anti-tilt wire bails per node) outwards to the unlocked position.

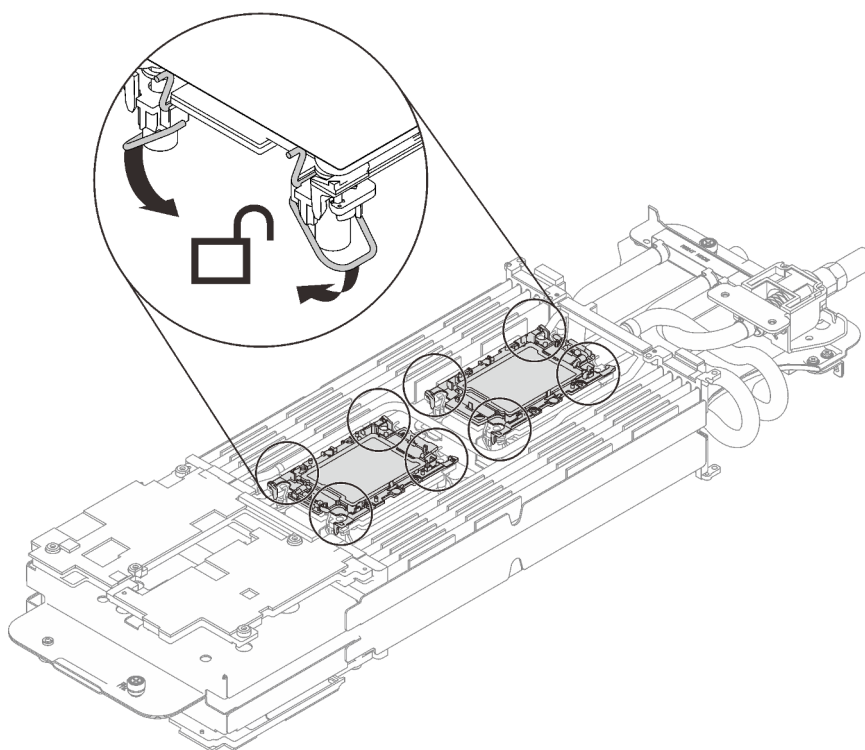


Figure 224. Processor unlocked position

Step 6. Check the gap pads on the water loop, if any of them are damaged or detached, replace them with the new ones.

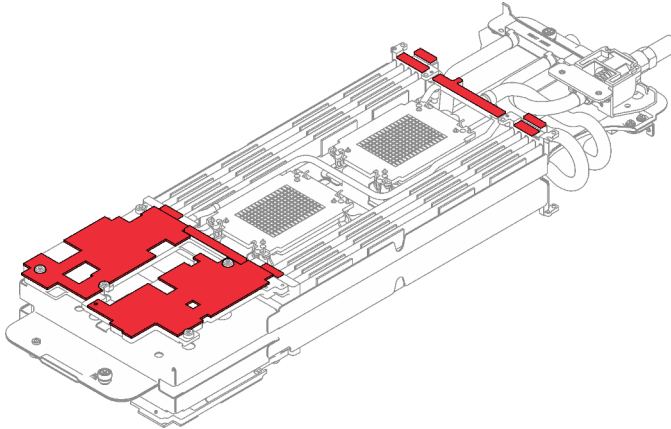


Figure 225. Water loop gap pads

Make sure to follow [Gap pad/putty pad replacement guidelines](#).

Step 7. Carefully rotate the top side of the water loop, position the water loop on the two guide pins near the rear of the node; then, gently put the water loop down and ensure it is firmly seated on the system board.

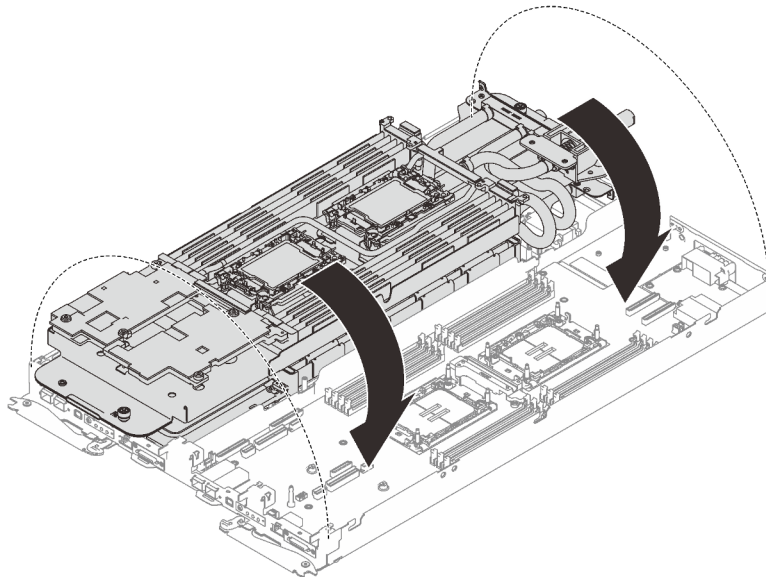


Figure 226. Water loop installation

- Step 8. Ensure the processors are secured properly.
- 1 Rotate the anti-tilt wire bails (8x anti-tilt wire bails per node) outwards to the locked position.
 - 2 Fully tighten all Torx T30 captive screws (8x Torx T30 captive screws per node) on cold plates with a general screwdriver until they stop, following the installation sequence shown on the cold plate label.

Note: For reference, the torque required for the screws to be fully tightened/removed is 10+/- 2.0 lbf-in, 1.1+/- 0.2 N-m.

Attention: To prevent damage to components, make sure that you follow the indicated tightening sequence.

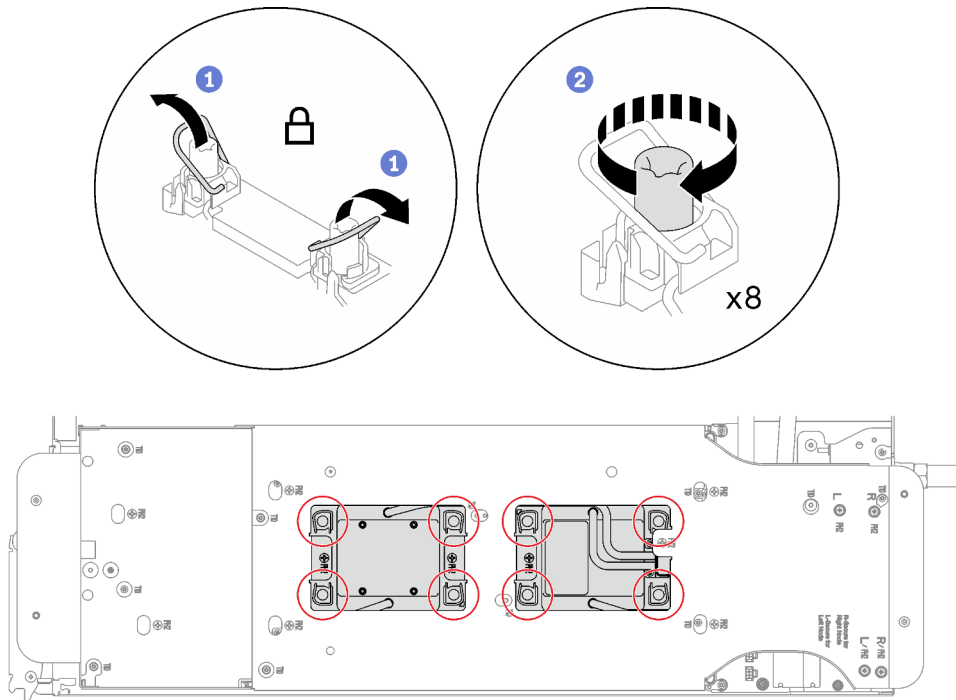


Figure 227. Processors installation

Step 9. Loosen water loop carrier screws (12x Phillips #2 screws per node).

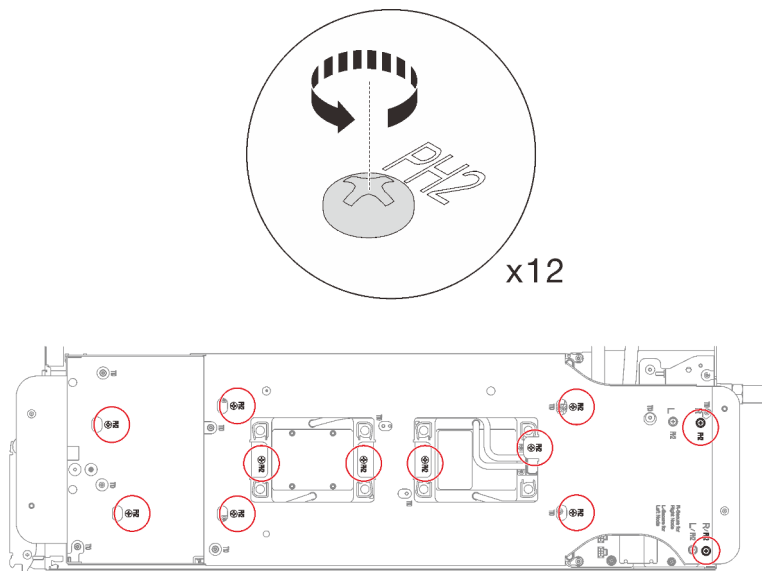


Figure 228. Loosening water loop carrier screws

Step 10. Carefully lift the water loop carrier up and away from the water loop.

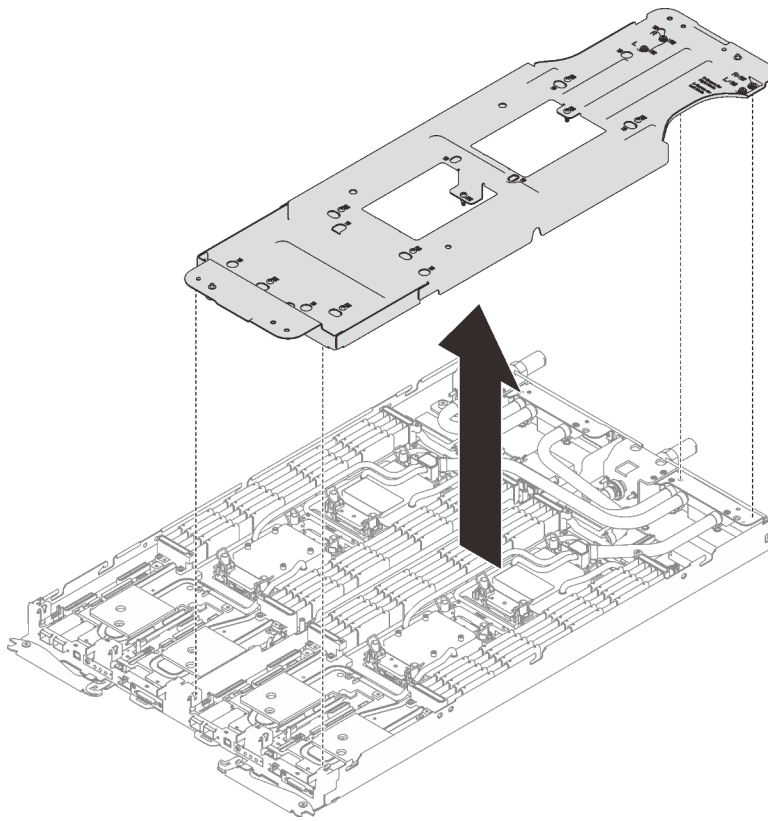


Figure 229. Water loop carrier removal

Step 11. Install water loop screws (9x Torx T10 screws per node) with a torque screwdriver set to the proper torque.

Note: For reference, the torque required for the screws to be fully tightened/removed is 5.0+/- 0.5 lbf-in, 0.55+/- 0.05 N-M.

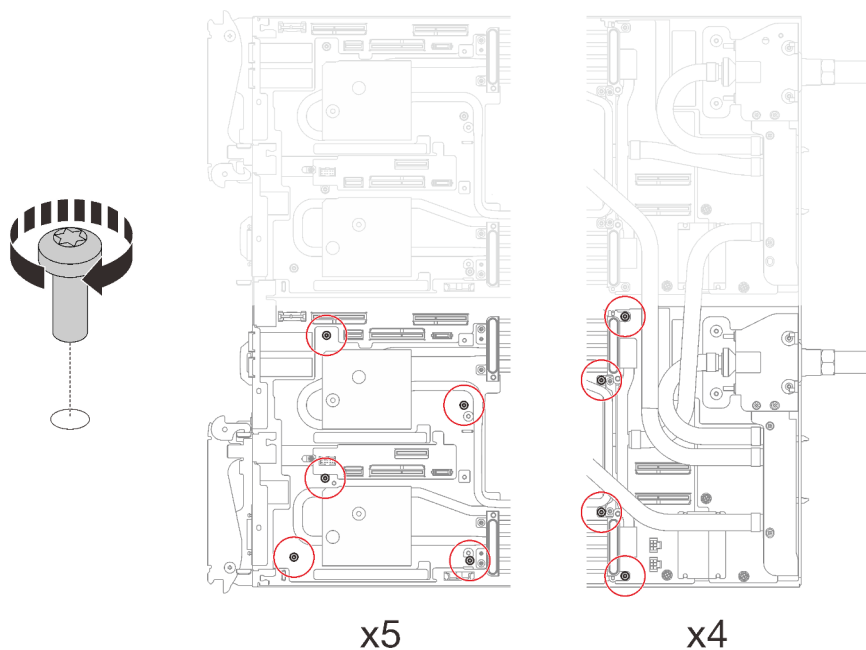


Figure 230. Water loop screws installation

Step 12. Install the following screws to secure the quick connect.

- Two Torx T10 screws (per node) on the quick connect.
- Five Torx T10 screws (per node) on the rear of the node.

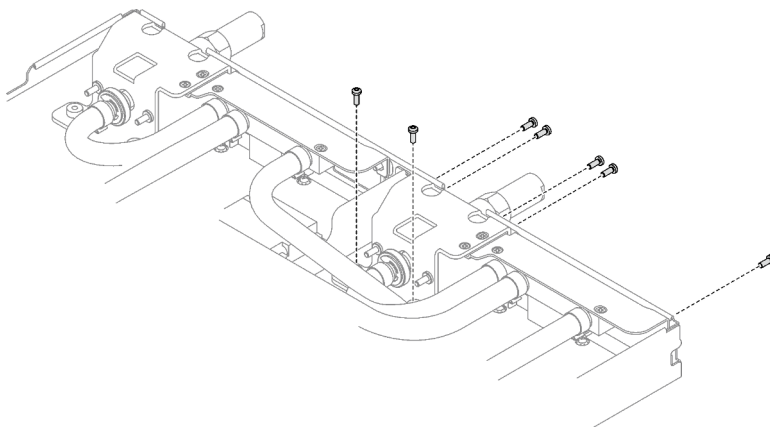


Figure 231. Quick connect screw installation

Step 13. Install the VR clamp plate into the node and install Torx T10 screws (2x Torx T10 screw per nodes).

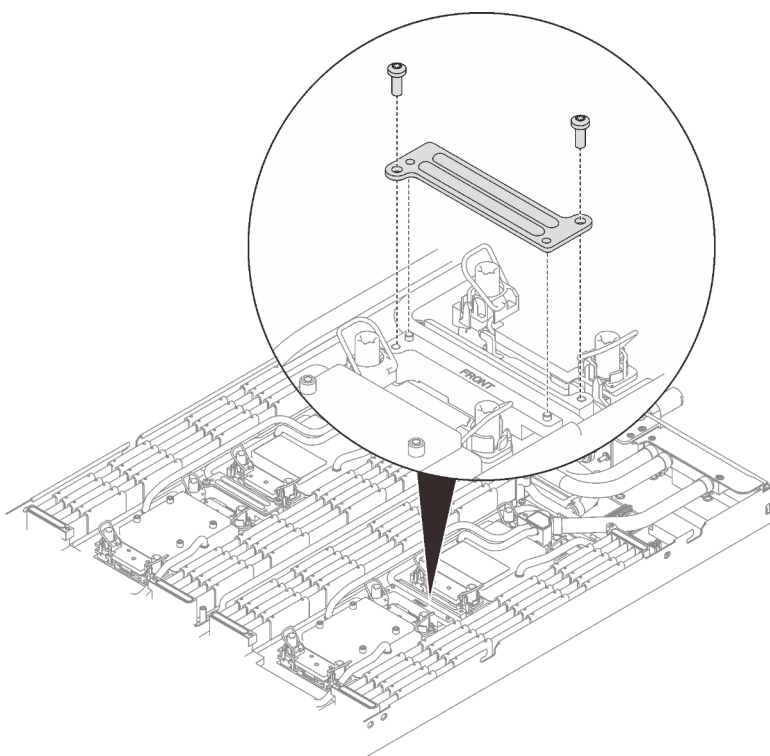


Figure 232. VR clamp plate installation

After you finish

1. Install the memory modules. See [“Install a memory module” on page 146](#).
2. Install the DIMM comb. See [“Install a DIMM comb” on page 83](#).
3. Install the M.2 backplane assembly. See [“Install the M.2 backplane assembly” on page 134](#).
4. Install the drive cage. See [“Install a drive cage assembly” on page 95](#).
5. Install the PCIe riser assembly. See [“Install a PCIe riser assembly \(ConnectX-6\)” on page 160](#) , [“PCIe riser assembly replacement \(ConnectX-7 NDR 200\)” on page 165](#), or [“Install a PCIe riser assembly \(ConnectX-7 NDR 400\)” on page 181](#).
6. Install the cross braces. See [“Install the cross braces” on page 52](#).
7. Install the tray cover. See [“Install the tray cover” on page 49](#).
8. Install the tray into the enclosure. See [“Install a DWC tray in the enclosure” on page 46](#).
9. Connect all required external cables to the solution.

Note: Use extra force to connect QSFP cables to the solution.

10. Check the power LED on each node to make sure it changes from fast blink to slow blink to indicate all nodes are ready to be powered on.
11. To enable Intel® On Demand Suite to the new processor, or to transfer Intel® On Demand Suite from the defective processor to the new processor, refer to [“Enable Intel® On Demand” on page 247](#).

Demo video

[Watch the procedure on YouTube](#)

System board replacement (trained technician only)

Follow instructions in this section to remove and install the system board.

Important: Before you return the system board, make sure that you install the CPU socket dust covers from the new system board. To replace a CPU socket dust cover:

1. Take a dust cover from the CPU socket assembly on the new system board and orient it correctly above the CPU socket assembly on the removed system board.
2. Gently press down the dust cover legs to the CPU socket assembly, pressing on the edges to avoid damage to the socket pins. You might hear a click on the dust cover is securely attached.
3. **Make sure** that the dust cover is securely attached to the CPU socket assembly.

Remove the system board

Use this information to remove the system board.

About this task

Required tools

Make sure you have the required tools listed below in hand to properly replace the component.

- Water loop kits
 - SD650 V3 Water loop service kit
 - Conduction plate parts (only damaged parts need to be replaced)
 - M.2 Putty pad kit
- Drive gap pad or putty pad kits according to the drives installed in the tray. See their respective replacement procedures for more information.
- ConnectX series adapter putty pad kits according to the ConnectX adapter installed in the tray. See their respective replacement procedures for more information.
- Screws and screwdriver

Prepare the following screwdrivers to ensure you can install and remove corresponding screws properly.

Screwdriver Type	Screw Type
Torx T10 head screwdriver	Torx T10 screw
Torx T30 head screwdriver	Torx T30 screw
Phillips #1 head screwdriver	Phillips #1 screw
Phillips #2 head screwdriver	Phillips #2 screw

Attention:

- Read [“Installation Guidelines” on page 31](#) and [“Safety inspection checklist” on page 32](#) to ensure that you work safely.
- Turn off the corresponding DWC tray that you are going to perform the task on.
- Disconnect all external cables from the enclosure.
- Use extra force to disconnect QSFP cables if they are connected to the solution.
- To avoid damaging the water loop, always use the water loop carrier when removing, installing or folding the water loop.

Procedure

Step 1. Make preparations for this task.

- a. Remove the tray from the enclosure. See [“Remove a DWC tray from the enclosure” on page 45.](#)
- b. Remove the tray cover. See [“Remove the tray cover” on page 48.](#)
- c. Remove the cross braces. See [“Remove the cross braces” on page 50.](#)
- d. Remove the DIMM comb. See [“Remove a DIMM comb” on page 81.](#)
- e. Remove memory modules. See [“Remove a memory module” on page 141.](#)
- f. Remove the M.2 backplane assembly. See [“Remove the M.2 backplane assembly” on page 130.](#)
- g. Remove the drive cage. See [“Remove a drive cage assembly” on page 85.](#)
- h. Remove the PCIe riser assembly. Depending on your configuration, see [“Remove a PCIe riser assembly \(ConnectX-6\)” on page 156,](#) [“PCIe riser assembly replacement \(ConnectX-7 NDR 200\)” on page 165,](#) or [“Remove a PCIe riser assembly \(ConnectX-7 NDR 400\)” on page 175.](#)
- i. Remove the power distribution board, and carefully rotate the water loop so one half is sitting on top of the other half. See [“Remove the power distribution board” on page 185.](#)

Step 2. Remove the two Torx T10 screws (per node) to remove the VR water loop trough out of the system board.

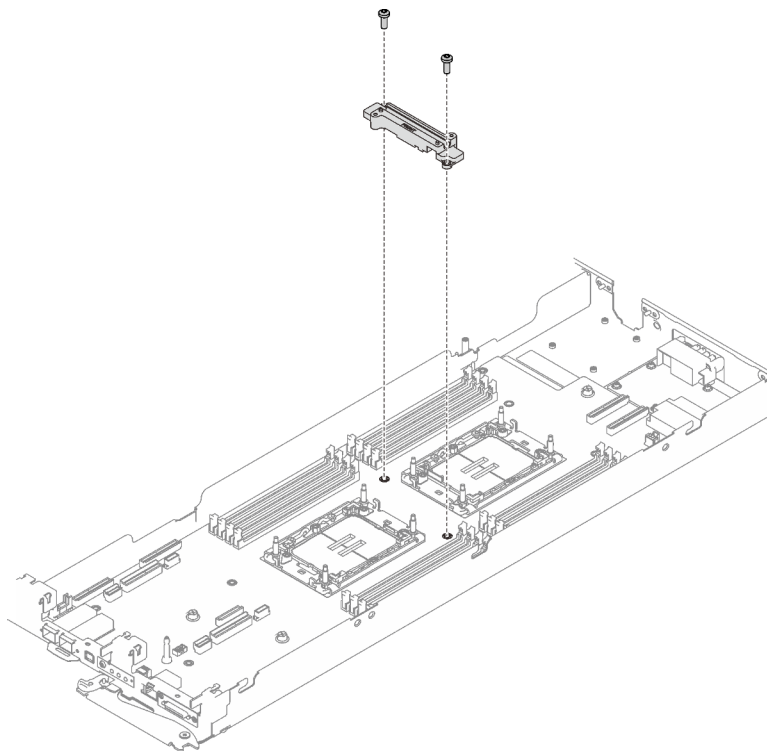


Figure 233. VR water loop trough removal

Step 3. Remove seven Phillips #1 screws per node on the system board (with a torque screwdriver set to the proper torque).

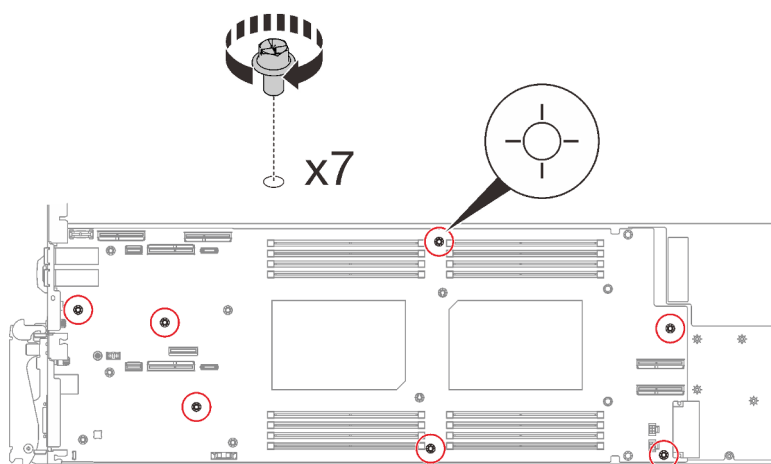


Figure 234. System board screws removal

Note: For reference, the torque required for the screws to be fully tightened/removed is 5.0+/- 0.5 lbf-in, 0.55+/- 0.05 N-M.

- Step 4. Carefully hold the guide pin and tilt the system board at an angle; then, gently slide and lift the system board backwards to remove the system board from the node.

Note: Avoid touching the connectors on the system board. Be careful not to damage any surrounding components inside the node.

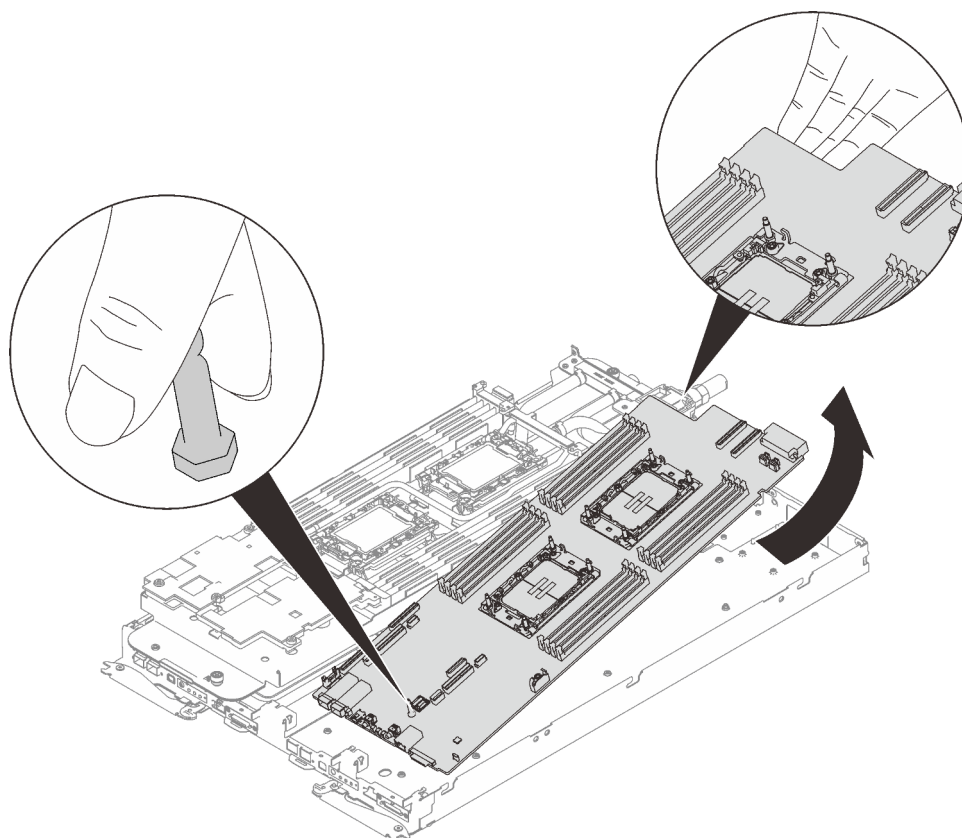


Figure 235. System board removal

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Important: Before you return the system board, make sure that you install the processor socket dust covers from the new system board. To replace a processor socket dust cover:

1. Take a dust cover from the processor socket assembly on the new system board and orient it correctly above the processor socket assembly on the removed system board.
2. Gently press down the dust cover legs to the processor socket assembly, pressing on the edges to avoid damage to the socket pins. You might hear a click on the dust cover is securely attached.
3. **Make sure** that the dust cover is securely attached to the processor socket assembly.

If you need to disassemble the system board, follow the instructions below:

Attention: You can only disassemble the system board for recycle. Do not disassemble it for any other purposes.

1. Remove the guide pin out of the system board.

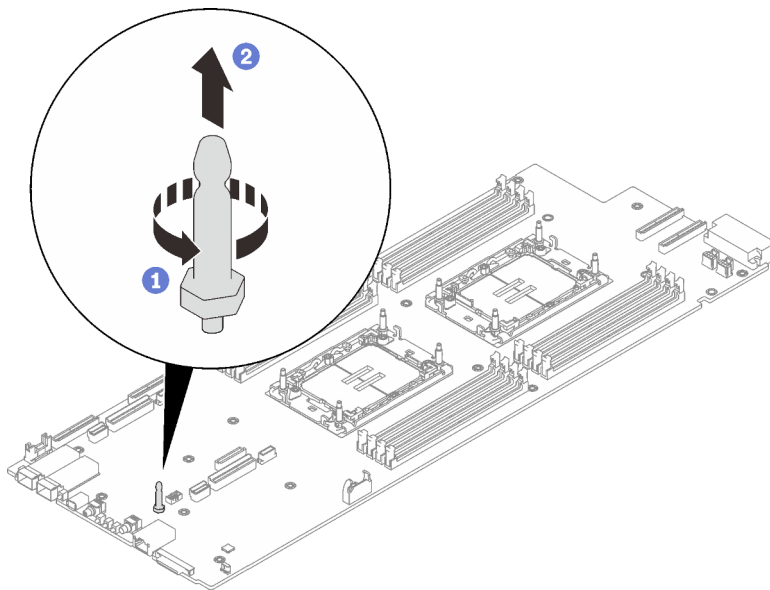


Figure 236. Guide pin removal

2. Recycle the unit in compliance with local regulations.

Demo video

[Watch the procedure on YouTube](#)

Install the system board

Use this information to install the system board.

About this task

Required tools

Make sure you have the required tools listed below in hand to properly replace the component.

- Water loop kits

- SD650 V3 Water loop service kit
- Conduction plate parts (only damaged parts need to be replaced)
- M.2 Putty pad kit
- Drive gap pad or putty pad kits according to the drives installed in the tray. See their respective replacement procedures for more information.
- ConnectX series adapter putty pad kits according to the ConnectX adapter installed in the tray. See their respective replacement procedures for more information.
- Screws and screwdriver

Prepare the following screwdrivers to ensure you can install and remove corresponding screws properly.

Screwdriver Type	Screw Type
Torx T10 head screwdriver	Torx T10 screw
Torx T30 head screwdriver	Torx T30 screw
Phillips #1 head screwdriver	Phillips #1 screw
Phillips #2 head screwdriver	Phillips #2 screw

Important: Gap pad/putty pad replacement guidelines

- To identify the gap pad/putty pad location and orientation, see [“Gap pad/Putty pad identification and location” on page 40](#).
- Before replacing the gap pad/putty pad, gently clean the interface plate or the hardware surface with an alcohol cleaning pad.
- Hold the gap pad/putty pad carefully to avoid deformation. Make sure no screw hole or opening is blocked by the gap pad/putty pad material.
- Do not use expired putty pad. Check the expiry date on putty pad package. If the putty pads are expired, acquire new ones to properly replace them.

Attention:

- Read [“Installation Guidelines” on page 31](#) and [“Safety inspection checklist” on page 32](#) to ensure that you work safely.
- Turn off the corresponding DWC tray that you are going to perform the task on.
- Disconnect all external cables from the enclosure.
- Use extra force to disconnect QSFP cables if they are connected to the solution.
- To avoid damaging the water loop, always use the water loop carrier when removing, installing or folding the water loop.

Firmware and driver download: You might need to update the firmware or driver after replacing a component.

- Go to <https://datacentersupport.lenovo.com/products/servers/thinksystem/sd650v3/7d7m/downloads/driver-list/> to see the latest firmware and driver updates for your server.
- Go to [“Update the firmware” on page 239](#) for more information on firmware updating tools.

Procedure

Note: Depending on the model, your solution might look slightly different from the illustration.

Step 1. Install the system board.

- a. Carefully hold the front guide pin and tilt the system board at an angle.

- b. Align the connectors with the corresponding holes on the front of the node; then, gently slide the system board forward.
- c. Orient the system board on the two guide pins near the rear of the node to insure proper alignment; then, carefully insert the system board into the node.

Note: Avoid touching the connectors on the system board. Be careful not to damage any surrounding components inside the node.

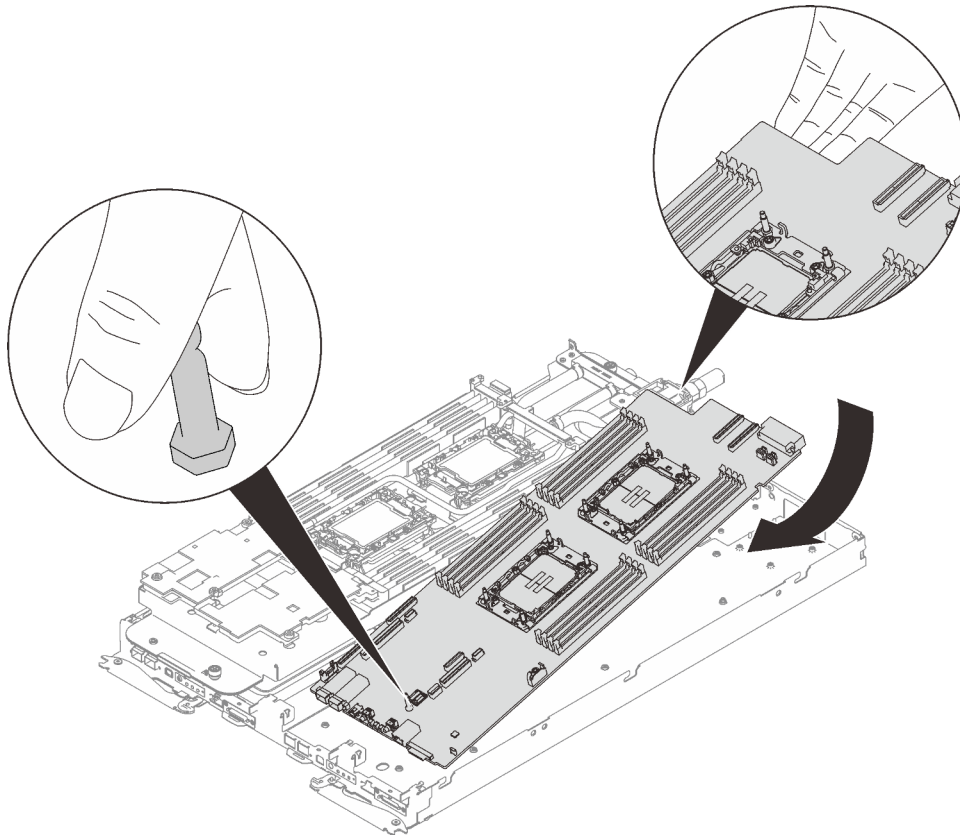


Figure 237. System board installation

- Step 2. Install and tighten seven Phillips #1 screws per node on the system board (with a torque screwdriver set to the proper torque).

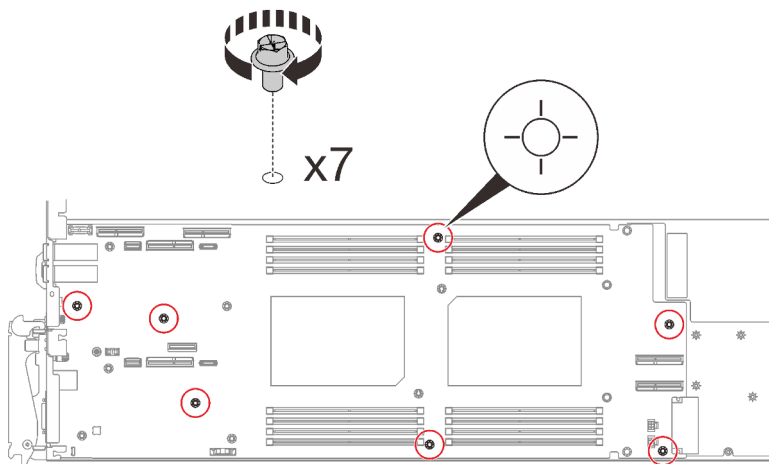


Figure 238. System board screws installation

Note: For reference, the torque required for the screws to be fully tightened/removed is 5.0+/- 0.5 lbf-in, 0.55+/- 0.05 N-M.

- Step 3. Check the gap pads on both sides of the VR water loop trough, if any of them are damaged or detached, replace them with the new ones.

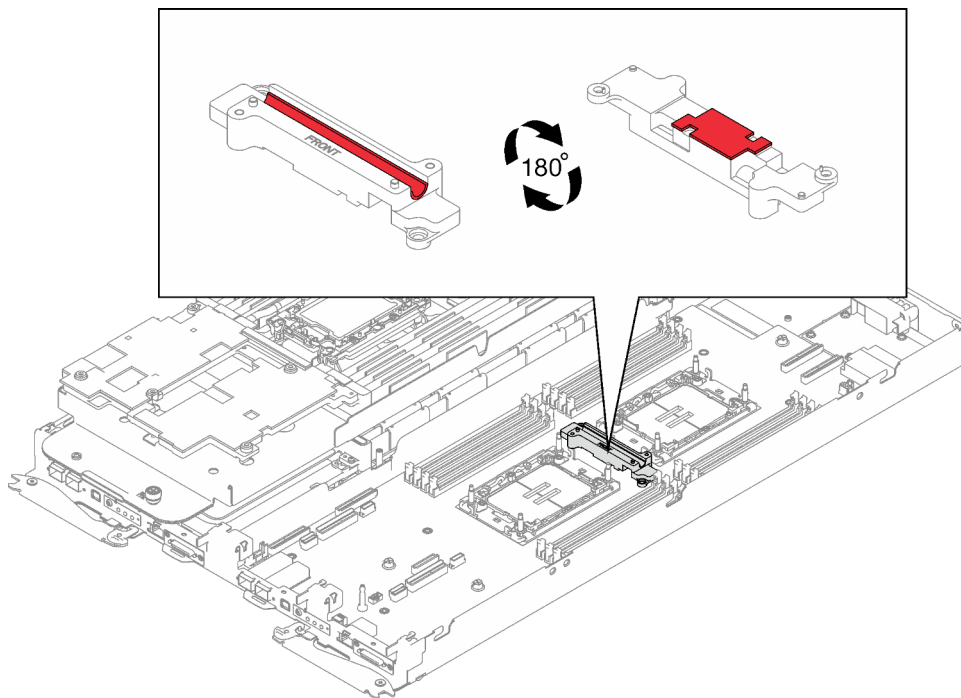


Figure 239. VR water loop trough gap pads

Make sure to follow [Gap pad/putty pad replacement guidelines](#).

- Step 4. Align the VR water loop trough with the holes on the system board; then, fasten the two Torx T10 screws (per node).

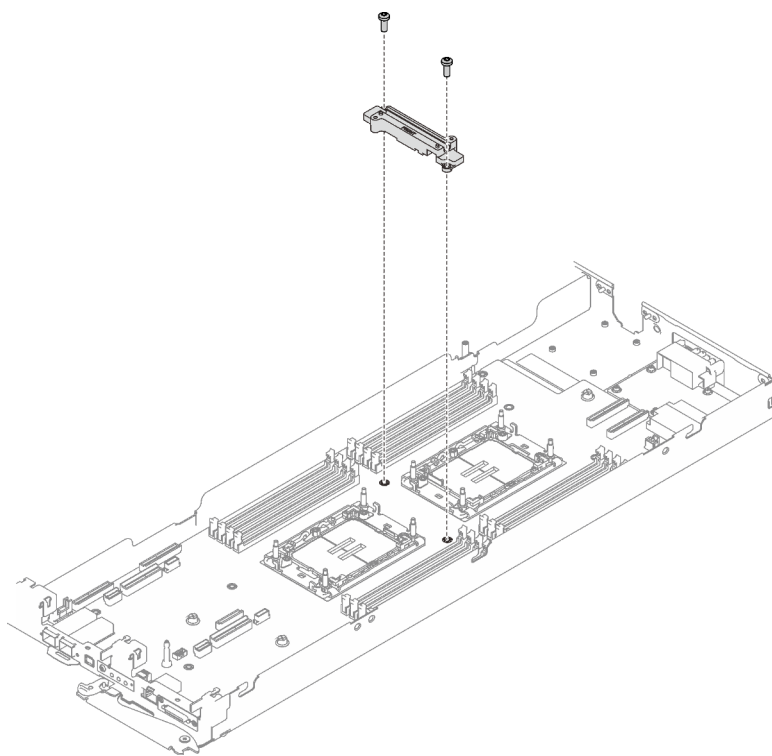


Figure 240. VR water loop trough installation

After you finish

1. Install the power distribution board. See [“Install the power distribution board” on page 191](#).
2. Install the water loop. See [“Install the water loop” on page 63](#).
3. Install the memory modules. See [“Install a memory module” on page 146](#).
4. Install the DIMM comb. See [“Install a DIMM comb” on page 83](#).
5. Install the M.2 backplane assembly. See [“Install the M.2 backplane assembly” on page 134](#).
6. Install the drive cage. See [“Install a drive cage assembly” on page 95](#).
7. Install the PCIe riser assembly. See [“Install a PCIe riser assembly \(ConnectX-6\)” on page 160](#), [“PCIe riser assembly replacement \(ConnectX-7 NDR 200\)” on page 165](#), or [“Install a PCIe riser assembly \(ConnectX-7 NDR 400\)” on page 181](#).
8. Install the cross braces. See [“Install the cross braces” on page 52](#).
9. Install the tray cover. See [“Install the tray cover” on page 49](#).
10. Install the tray into the enclosure. See [“Install a DWC tray in the enclosure” on page 46](#).
11. Connect all required external cables to the solution.

Note: Use extra force to connect QSFP cables to the solution.

12. Check the power LED on each node to make sure it changes from fast blink to slow blink to indicate all nodes are ready to be powered on.
13. Update the vital product data (VPD). See [“Update the Vital Product Data \(VPD\)” on page 225](#).

Machine type number and serial number can be found on the ID label, see [“Identify the solution and access the Lenovo XClarity Controller” on page 25](#).

14. Enable TPM/TCM. See [“Enable TPM” on page 226](#).

15. If hiding TPM or updating TPM firmware is needed, see [“Hide/observe TPM” on page 228](#) or [“Update the TPM firmware” on page 229](#).
16. Optionally, enable UEFI Secure Boot. See [“Enable UEFI Secure Boot” on page 230](#).

Demo video

[Watch the procedure on YouTube](#)

Update the Vital Product Data (VPD)

Use this topic to update the Vital Product Data (VPD).

- **(Required)** Machine type
- **(Required)** Serial number
- (Optional) Asset tag
- (Optional) UUID

Recommended tools:

- Lenovo XClarity Provisioning Manager
- Lenovo XClarity Essentials OneCLI commands

Using Lenovo XClarity Provisioning Manager

Steps:

1. Start the server and press the key according to the on-screen instructions. The Lenovo XClarity Provisioning Manager interface is displayed by default.
2. Choose **System Summary**. The “System Summary” tab page is displayed.
3. Click **Update VPD**, then, follow on-screen instructions to update the VPD.

Using Lenovo XClarity Essentials OneCLI commands

- Updating **machine type**
onecli config set SYSTEM_PROD_DATA.SysInfoProdName <m/t_model> [access_method]
- Updating **serial number**
onecli config set SYSTEM_PROD_DATA.SysInfoSerialNum <s/n> [access_method]
- Updating **system model**
onecli config set SYSTEM_PROD_DATA.SysInfoProdIdentifier <system model> [access_method]
onecli config set SYSTEM_PROD_DATA.SysInfoProdIdentifierEx <system model> --override [access_method]
- Updating **asset tag**
onecli config set SYSTEM_PROD_DATA.SysEncloseAssetTag <asset_tag> [access_method]
- Updating **UUID**
onecli config createuuid SYSTEM_PROD_DATA.SysInfoUUID [access_method]

Variable	Description
<m/t_model>	The server machine type and model number. Type xxxxyyy, where xxxx is the machine type and yyy is the server model number.
<s/n>	The serial number on the server. Type zzzzzzz, where zzzzzzz is the serial number.

<code><system_model></code>	<p>The system model on the server.</p> <p>Type <code>system yyyyyyyy</code>, where <code>yyyyyyy</code> is the product identifier.</p>
<code><asset_tag></code>	<p>The server asset tag number.</p> <p>Type <code>aaaaaaaaaaaaaaaaaaaaaaaaaaaaa</code>, where <code>aaaaaaaaaaaaaaaaaaaaaaaaaaaaa</code> is the asset tag number.</p>
<code>[access_method]</code>	<p>The access method that you select to access the target server.</p> <ul style="list-style-type: none"> Online KCS (unauthenticated and user restricted): You can directly delete <code>[access_method]</code> from the command. Online authenticated LAN: In this case, specify below LAN account information at the end of the OneCLI command: <code>--bmc-username <user_id> --bmc-password <password></code> Remote WAN/LAN: In this case, specify below XCC account information and IP address at the end of the OneCLI command: <code>--bmc <bmc_user_id>:<bmc_password>@<bmc_external_IP></code> <p>Notes:</p> <ul style="list-style-type: none"> <code><bmc_user_id></code> The BMC account name (1 of 12 accounts). The default value is USERID. <code><bmc_password></code> The BMC account password (1 of 12 accounts).

Enable TPM

The server supports Trusted Platform Module (TPM), Version 1.2 or Version 2.0

Note: For customers in Chinese Mainland, integrated TPM is not supported. However, customers in Chinese Mainland can install a Trusted Cryptographic Module (TCM) adapter or a TPM adapter (sometimes called a daughter card).

When a system board is replaced, you must make sure that the TPM policy is set correctly.

CAUTION:

Take special care when setting the TPM policy. If it is not set correctly, the system board can become unusable.

Set the TPM policy

By default, a replacement system board is shipped with the TPM policy set to **undefined**. You must modify this setting to match the setting that was in place for the system board that is being replaced.

There are two methods available to set the TPM policy:

- From Lenovo XClarity Provisioning Manager

To set the TPM policy from Lenovo XClarity Provisioning Manager:

- Start the server and press the key specified in the on-screen instructions to display the Lenovo XClarity Provisioning Manager interface. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.)
- If the power-on Administrator password is required, enter the password.
- From the System Summary page, click **Update VPD**.
- Set the policy to one of the following settings.

- **NationZ TPM 2.0 enabled - China only.** Customers in the Chinese Mainland should choose this setting if a NationZ TPM 2.0 adapter is installed.
- **TPM enabled - ROW.** Customers outside of the Chinese Mainland should choose this setting.
- **Permanently disabled.** Customers in the Chinese Mainland should use this setting if no TPM adapter is installed.

Note: Although the setting **undefined** is available as a policy setting, it should not be used.

- From Lenovo XClarity Essentials OneCLI

Note: Please note that a Local IPMI user and password must be setup in Lenovo XClarity Controller for remote accessing to the target system.

To set the TPM policy from Lenovo XClarity Essentials OneCLI:

1. Read TpmTcmPolicyLock to check whether the TPM_TCM_POLICY has been locked:
`OneCli.exe config show imm.TpmTcmPolicyLock --override --imm <userid>:<password>@<ip_address>`

Note: The imm.TpmTcmPolicyLock value must be 'Disabled', which means TPM_TCM_POLICY is NOT locked and changes to the TPM_TCM_POLICY are permitted. If the return code is 'Enabled' then no changes to the policy are permitted. The planar may still be used if the desired setting is correct for the system being replaced.

2. Configure the TPM_TCM_POLICY into XCC:

- For customers in Chinese Mainland with no TPM, or customers that require to disable TPM:
`OneCli.exe config set imm.TpmTcmPolicy "NeitherTpmNorTcm" --override --imm <userid>:<password>@<ip_address>`
- For customers in Chinese Mainland that require to enable TPM:
`OneCli.exe config set imm.TpmTcmPolicy "NationZTPM20Only" --override --imm <userid>:<password>@<ip_address>`
- For customers outside Chinese Mainland that require to enable TPM:
`OneCli.exe config set imm.TpmTcmPolicy "TpmOnly" --override --imm <userid>:<password>@<ip_address>`

3. Issue reset command to reset system:
`OneCli.exe misc ospower reboot --imm <userid>:<password>@<ip_address>`

4. Read back the value to check whether the change has been accepted:
`OneCli.exe config show imm.TpmTcmPolicy --override --imm <userid>:<password>@<ip_address>`

Notes:

- If the read back value is matched it means the TPM_TCM_POLICY has been set correctly.

imm.TpmTcmPolicy is defined as below:

- Value 0 use string "Undefined", which means UNDEFINED policy.
- Value 1 use string "NeitherTpmNorTcm", which means TPM_PERM_DISABLED.
- Value 2 use string "TpmOnly", which means TPM_ALLOWED.
- Value 4 use string "NationZTPM20Only", which means NationZ_TPM20_ALLOWED.
- Below 4 steps must also be used to 'lock' the TPM_TCM_POLICY when using OneCli/ASU commands:

5. Read TpmTcmPolicyLock to check whether the TPM_TCM_POLICY has been locked, command as below:

`OneCli.exe config show imm.TpmTcmPolicyLock --override --imm <userid>:<password>@<ip_address>`

The value must be 'Disabled', it means TPM_TCM_POLICY is NOT locked and must be set.

6. Lock the TPM_TCM_POLICY:
`OneCli.exe config set imm.TpmTcmPolicyLock "Enabled" --override --imm <userid>:<password>@<ip_address>`

7. Issue reset command to reset system, command as below:

```
OneCli.exe misc ospower reboot --imm <userid>:<password>@<ip_address>
```

During the reset, UEFI will read the value from imm.TpmTcmPolicyLock, if the value is 'Enabled' and the imm.TpmTcmPolicy value is valid, UEFI will lock the TPM_TCM_POLICY setting.

Note: The valid values for imm.TpmTcmPolicy include 'NeitherTpmNorTcm', 'TpmOnly', and 'NationZTPM20Only'.

If the imm.TpmTcmPolicyLock is set as 'Enabled' but imm.TpmTcmPolicy value is invalid, UEFI will reject the 'lock' request and change imm.TpmTcmPolicyLock back to 'Disabled'.

8. Read back the value to check whether the 'Lock' is accepted or rejected. Command as below:

```
OneCli.exe config show imm.TpmTcmPolicy --override --imm <userid>:<password>@<ip_address>
```

Note: If the read back value is changed from 'Disabled' to 'Enabled' that means the TPM_TCM_POLICY has been locked successfully. There is no method to unlock a policy once it has been set other than replacing system board.

imm.TpmTcmPolicyLock is defined as below:

Value 1 uses string "Enabled" , which means lock the policy. Other values are not accepted.

Hide/observe TPM

TPM is enabled by default to encrypt data transfer for system operation. Optionally, you can disable TPM using Lenovo XClarity Essentials OneCLI.

To disable TPM, do the following:

1. Download and install Lenovo XClarity Essentials OneCLI.

To download Lenovo XClarity Essentials OneCLI, go to the following site:

<https://datacentersupport.lenovo.com/solutions/HT116433>

2. Run the following command:

```
OneCli.exe config set TrustedComputingGroup.HideTPMfromOS "Yes" --imm <userid>:<password>@<ip_address> --override
```

where:

- <userid>:<password> are the credentials used to access the BMC (Lenovo XClarity Controller interface) of your server. The default user ID is USERID, and the default password is PASSWORD (zero, not an uppercase o)
- <ip_address> is the IP address of the BMC.

Example:

```
D:\onecli>OneCli.exe config set TrustedComputingGroup.HideTPMfromOS "Yes" --imm USERID:PASSWORD=10.245.39.79 --override
Lenovo XClarity Essentials OneCLI 1xce_onecli01p-2.3.0
Licensed Materials - Property of Lenovo
(C) Copyright Lenovo Corp. 2013-2018 All Rights Reserved
If the parameters you input includes password, please Note that:
* The password must consist of a sequence of characters from '0-9a-zA-Z_+.$%&!^&*()' set
* Use "" to quote when password parameters include special characters
* Do not use reserved characters in path name when parameter contains path
Invoking SET command ...
Connected to BMC at IP address 10.245.39.79 by IPMI
TrustedComputingGroup.HideTPMfromOS=Yes
Success.
```

3. Reboot the system.

If you want to enable TPM again, run the following command and reboot the system:

```
OneCli.exe config set TrustedComputingGroup.HideTPMfromOS "No" --imm <userid>:<password>@<ip_address> --override
```

Example:

```
D:\onecli3>OneCli.exe config set TrustedComputingGroup.HideTPMfromOS "No" --imm USERID:PASSWORD=11@10.245.39.79 --override
Lenovo XClarity Essentials OneCLI 1xce_onecli01h-3.0.1
(C) Lenovo 2013-2020 All Rights Reserved

OneCLI License Agreement and OneCLI Legal Information can be found at the following location:
"D:\onecli3\Lic"

[1s]Certificate check finished [100%][=====]
Invoking SET command ...
Connected to BMC at IP address 10.245.39.79 by IPMI
TrustedComputingGroup.HideTPMfromOS=No
Configure successfully, please reboot system.
Succeed.
```

Update the TPM firmware

Optionally, you can update the TPM firmware using Lenovo XClarity Essentials OneCLI.

Note: TPM firmware update is irreversible. After update, the TPM firmware cannot be downgraded to earlier versions.

TPM firmware version

Follow the procedure below to see the TPM firmware version:

From Lenovo XClarity Provisioning Manager

1. Start the server and press the key specified in the on-screen instructions to display the Lenovo XClarity Provisioning Manager interface. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.)
2. If the power-on Administrator password is required, enter the password.
3. From the UEFI Setup page, click **System Settings → Security → Trusted Platform Module → TPM 2.0 → TPM Firmware Version**.

Update the TPM firmware

To update the TPM firmware, do the following:

1. Download and install Lenovo XClarity Essentials OneCLI.

To download Lenovo XClarity Essentials OneCLI, go to the following site:

<https://datacentersupport.lenovo.com/solutions/HT116433>

2. Run the following command:

```
OneCli.exe config set TrustedComputingGroup.DeviceOperation "Update to TPM 2.0 firmware version <x.x.x.x>" --bmc
<userid>:<password>@<ip_address>
```

where:

- <x.x.x.x> is the target TPM version.

e.g. TPM 2.0 (7.2.1.0) -> TPM 2.0 (7.2.2.0):

```
OneCli.exe config set TrustedComputingGroup.DeviceOperation "Update to TPM 2.0 firmware version 7.2.2.0" --bmc
<userid>:<password>@<ip_address>
```

- <userid>:<password> are the credentials used to access the BMC (Lenovo XClarity Controller interface) of your server. The default user ID is USERID, and the default password is PASSWORD (zero, not an uppercase o).
- <ip_address> is the IP address of the BMC.

Enable UEFI Secure Boot

Optionally, you can enable UEFI Secure Boot.

There are two methods available to enable UEFI Secure Boot:

- From Lenovo XClarity Provisioning Manager

To enable UEFI Secure Boot from Lenovo XClarity Provisioning Manager:

1. Start the server and press the key specified in the on-screen instructions to display the Lenovo XClarity Provisioning Manager interface. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.)
2. If the power-on Administrator password is required, enter the password.
3. From the UEFI Setup page, click **System Settings → Security → Secure Boot**.
4. Enable Secure Boot and save the settings.

Note: If disabling UEFI secure boot is needed, select Disable in step 4.

- From Lenovo XClarity Essentials OneCLI

To enable UEFI Secure Boot from Lenovo XClarity Essentials OneCLI:

1. Download and install Lenovo XClarity Essentials OneCLI.

To download Lenovo XClarity Essentials OneCLI, go to the following site:

<https://datacentersupport.lenovo.com/solutions/HT116433>

2. Run the following command to enable Secure Boot:

```
OneCli.exe config set SecureBootConfiguration.SecureBootSetting Enabled --bmc <userid>:<password>@<ip_
address>
```

where:

- *<userid>:<password>* are the credentials used to access the BMC (Lenovo XClarity Controller interface) of your server. The default user ID is USERID, and the default password is PASSWORD (zero, not an uppercase o)
- *<ip_address>* is the IP address of the BMC.

For more information about the Lenovo XClarity Essentials OneCLI `set` command, see:

https://pubs.lenovo.com/lxce-onecli/onecli_r_set_command

Note: If disabling UEFI secure boot is needed, run the following command:

```
OneCli.exe config set SecureBootConfiguration.SecureBootSetting Disabled --bmc <userid>:<password>@<ip_
address>
```

Complete the parts replacement

Go through the checklist to complete parts replacement

To complete the parts replacement, do the following:

1. Ensure that all components have been reassembled correctly and that no tools or loose screws are left inside your solution.
2. Properly route and secure the cables in the solution. Refer to the cable connecting and routing information for each component.
3. If you have removed the tray cover, reinstall it. See “[Install the tray cover](#)” on page 49.
4. Reconnect external cables and power cords to the solution.

Attention: To avoid component damage, connect the power cords last.

5. Power on the solution and any peripheral devices. See [“Power on the solution” on page 44](#).
6. Update the solution configuration.
 - Download and install the latest device drivers: <http://datacentersupport.lenovo.com>.
 - Update the system firmware. See [“Update the firmware” on page 239](#).
 - Update the UEFI configuration. See <https://pubs.lenovo.com/uefi-overview/>.
 - Reconfigure the disk arrays if you have installed or removed a hot-swap drive or a RAID adapter. See <https://pubs.lenovo.com/lxpm-overview/> for the LXPM documentation compatible with your solution.

Chapter 6. Internal cable routing

See this section to do cable routing for specific components.

Note: Disengage all latches, release tabs, or locks on cable connectors when you disconnect cables from the system board. Failing to release them before removing the cables will damage the cable sockets on the system board, which are fragile. Any damage to the cable sockets might require replacing the system board.

PCIe adapter in compute node cable routing

Use this information to route the cables for PCIe adapters in the compute node.

PCIe adapter configuration and cable routing

- [“Shared I/O configuration for ConnectX-6 with the auxiliary adapter kit” on page 233](#)
- [“Shared I/O configuration for ConnectX-6 without auxiliary adapter kit, ConnectX-7 NDR 200, and ConnectX-7 NDR 400” on page 234](#)
- [“Socket direct configuration for ConnectX-7 NDR 200/ConnectX-7 NDR 400” on page 235](#)

Shared I/O configuration for ConnectX-6 with the auxiliary adapter kit

This configuration supports ConnectX-6 that comes with the auxiliary adapter kit.

Attention: Shared I/O configuration requires specific power on and power off sequence for the two nodes, see below:

- Power on sequence: first, power on the node with **main** adapter (right node); then, power on the node with **auxiliary** adapter (left node).
- Power off sequence: first, power off the node with **auxiliary** adapter (left node); then, power off the node with **main** adapter (right node).

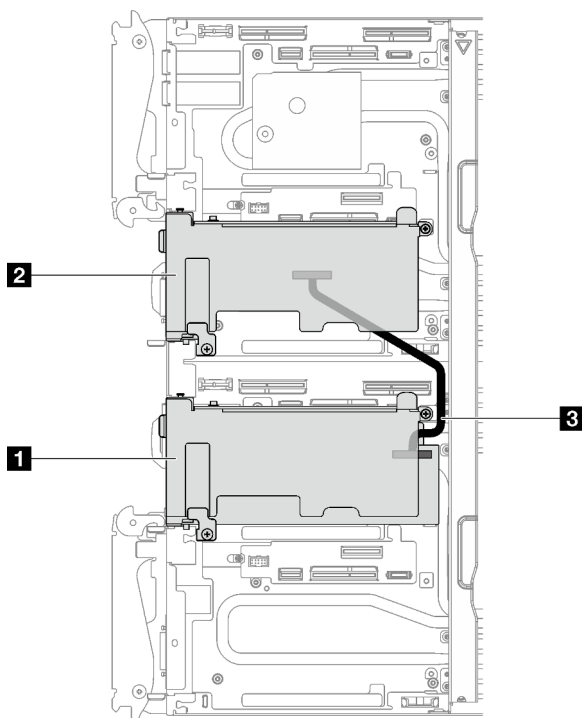


Figure 241. Cable routing—Shared I/O configuration for ConnectX-6 with the auxiliary adapter kit

1 Main adapter with riser
2 Auxiliary adapter with riser
3 350 mm IPEX cable (CX-6)

Shared I/O configuration for ConnectX-6 without auxiliary adapter kit, ConnectX-7 NDR 200, and ConnectX-7 NDR 400

This configuration supports the following adapters:

- ConnectX-6 without the auxiliary adapter kit.
- ConnectX-7 NDR 200 and ConnectX-7 NDR 400

Attention: Shared I/O configuration requires specific power on and power off sequence for the two nodes, see below:

- Power on sequence: first, power on the node with **main** adapter (right node); then, power on the node with **auxiliary** adapter (left node).
- Power off sequence: first, power off the node with **auxiliary** adapter (left node); then, power off the node with **main** adapter (right node).

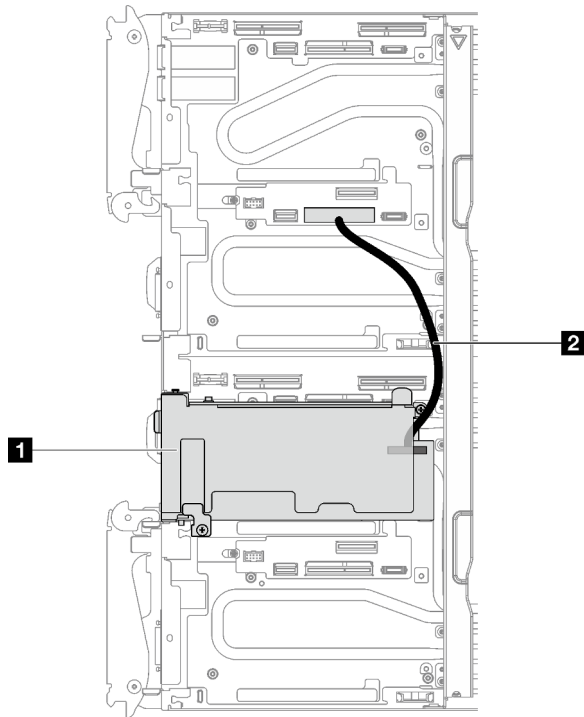


Figure 242. Cable routing—Shared I/O configuration for ConnectX-6 without auxiliary adapter kit, ConnectX-7 NDR 200, and ConnectX-7 NDR 400

1 Main adapter with riser (right node)

2 SD650 V3 Shared I/O cable (190 mm). The cable is directly connected to PCIe riser 1 slot on system board of the left node.

Socket direct configuration for ConnectX-7 NDR 200/ConnectX-7 NDR 400

This configuration supports ConnectX-7 NDR 200 and ConnectX-7 NDR 400.

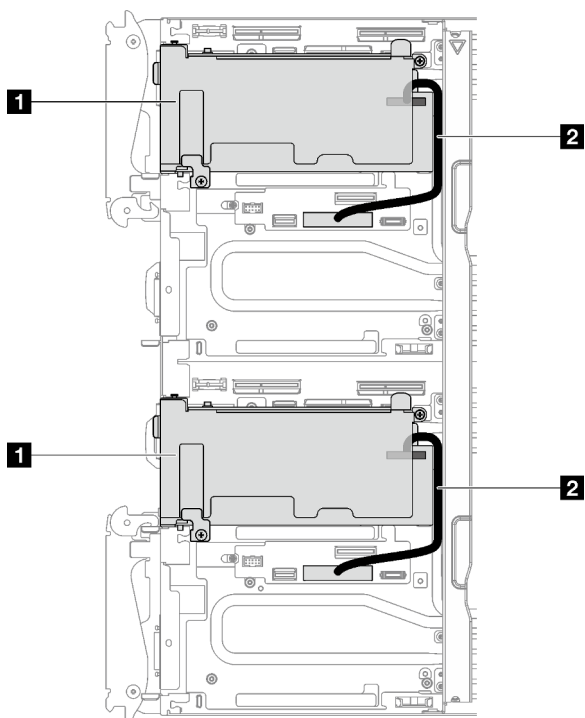


Figure 243. Cable routing—Socket direct configuration for ConnectX-7 NDR 200/ConnectX-7 NDR 400 cable routing

1 Main adapter with riser

2 SD650 V3 Share I/O cable (190 mm). The cable is directly connected to PCIe riser 1 slot on the system board of the left node or right node.

Chapter 7. System configuration

Complete these procedures to configure your system.

Set the network connection for the Lenovo XClarity Controller

Before you can access the Lenovo XClarity Controller over your network, you need to specify how Lenovo XClarity Controller will connect to the network. Depending on how the network connection is implemented, you might need to specify a static IP address as well.

The following methods are available to set the network connection for the Lenovo XClarity Controller if you are not using DHCP:

- If a monitor is attached to the server, you can use Lenovo XClarity Provisioning Manager to set the network connection.

Complete the following steps to connect the Lenovo XClarity Controller to the network using the Lenovo XClarity Provisioning Manager.

1. Start the server.
2. Press the key specified in the on-screen instructions to display the Lenovo XClarity Provisioning Manager interface. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.)
3. Go to **LXPM → UEFI Setup → BMC Settings** to specify how the Lenovo XClarity Controller will connect to the network.
 - If you choose a static IP connection, make sure that you specify an IPv4 or IPv6 address that is available on the network.
 - If you choose a DHCP connection, make sure that the MAC address for the server has been configured in the DHCP server.
4. Click **OK** to apply the setting and wait for two to three minutes.
5. Use an IPv4 or IPv6 address to connect Lenovo XClarity Controller.

Important: The Lenovo XClarity Controller is set initially with a user name of USERID and password of PASSW0RD (with a zero, not the letter O). This default user setting has Supervisor access. It is required to change this user name and password during your initial configuration for enhanced security.

- If no monitor is attached to the server, you can set the network connection through the System Management Module interface. Connect an Ethernet cable from your laptop to the Ethernet port on the System Management Module, which is located at the rear of the server.

Note: Make sure that you modify the IP settings on the laptop so that it is on the same network as the server default settings.

To access the System Management Module interface, the System Management Module network must be enabled. For more information about accessing the System Management Module, see: *System Management Module User's Guide* at https://pubs.lenovo.com/mgt_tools_smm2/.

The default IPv4 address and the IPv6 Link Local Address (LLA) is provided on the Lenovo XClarity Controller Network Access label that is affixed to the Pull Out Information Tab. See “[Identify the solution and access the Lenovo XClarity Controller](#)” on page 25.

- If you are using the Lenovo XClarity Administrator Mobile app from a mobile device, you can connect to the Lenovo XClarity Controller through the Lenovo XClarity Controller USB connector or USB 3.0 Console

Breakout Cable. For location of Lenovo XClarity Controller USB connector and USB 3.0 Console Breakout Cable connector, see “[Front view](#)” on page 15.

To connect using the Lenovo XClarity Administrator Mobile app:

1. If applicable, connect the USB 3.0 Console Breakout Cable to the front panel.
2. Connect the USB cable of your mobile device to the Lenovo XClarity Controller USB connector or USB 3.0 Console Breakout Cable.
3. On your mobile device, enable USB tethering.
4. On your mobile device, launch the Lenovo XClarity Administrator mobile app.
5. If automatic discovery is disabled, click **Discovery** on the USB Discovery page to connect to the Lenovo XClarity Controller.

For more information about using the Lenovo XClarity Administrator Mobile app, see:

http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/lxca_usemobileapp.html

Set USB port for Lenovo XClarity Controller connection

Before you can access the Lenovo XClarity Controller through the USB port, you need to configure the USB port for Lenovo XClarity Controller connection.

Server support

To see if your server supports accessing Lenovo XClarity Controller through the USB port, check one of the following:

- Refer to [Chapter 2 “Server components” on page 15](#).



- If there is a wrench icon on the USB port of your server, you can set the management USB port to connect to Lenovo XClarity Controller. It is also the only USB port that supports USB automation update of the firmware and RoT security module.

Setting the USB port for Lenovo XClarity Controller connection

You can switch the USB port between normal and Lenovo XClarity Controller management operation by performing one of the following steps.

- Hold the ID button for at least 3 second until its LED flashes slowly (once every couple of seconds). See [Chapter 2 “Server components” on page 15](#) for ID button location.
- From the Lenovo XClarity Controller management controller CLI, run the `usbfp` command. For information about using the Lenovo XClarity Controller CLI, see the “Command-line interface” section in the XCC documentation compatible with your server at <https://pubs.lenovo.com/lxcc-overview/>.
- From the Lenovo XClarity Controller management controller web interface, click **BMC Configuration → Network → USB Management Port Assignment**. For information about Lenovo XClarity Controller web interface functions, see the “Description of XClarity Controller functions on web interface” section in the XCC documentation compatible with your server at <https://pubs.lenovo.com/lxcc-overview/>.

Checking USB port current setting

You can also check the current setting of the USB port using the Lenovo XClarity Controller management controller CLI (`usbfp` command) or the Lenovo XClarity Controller management controller web interface (**BMC Configuration → Network → USB Management Port Assignment**). See the “Command-line

interface” and “Description of XClarity Controller functions on web interface” sections in the XCC documentation compatible with your server at <https://pubs.lenovo.com/lxcc-overview/>.

Update the firmware

Several options are available to update the firmware for the server.

You can use the tools listed here to update the most current firmware for your server and the devices that are installed in the server.

- Best practices related to updating firmware is available at the following site:
 - <https://lenovopress.lenovo.com/lp0656-lenovo-thinksystem-firmware-and-driver-update-best-practices>
- The latest firmware can be found at the following site:
 - <https://datacentersupport.lenovo.com/products/servers/thinksystem/sd650v3/7d7m/downloads/driver-list/>
- You can subscribe to product notification to stay up to date on firmware updates:
 - <https://datacentersupport.lenovo.com/solutions/ht509500>

Update Bundles (Service Packs)

Lenovo typically releases firmware in bundles called Update Bundles (Service Packs). To ensure that all of the firmware updates are compatible, you should update all firmware at the same time. If you are updating firmware for both the Lenovo XClarity Controller and UEFI, update the firmware for Lenovo XClarity Controller first.

Update method terminology

- **In-band update.** The installation or update is performed using a tool or application within an operating system that is executing on the server’s core CPU.
- **Out-of-band update.** The installation or update is performed by the Lenovo XClarity Controller collecting the update and then directing the update to the target subsystem or device. Out-of-band updates have no dependency on an operating system executing on the core CPU. However, most out-of-band operations do require the server to be in the S0 (Working) power state.
- **On-Target update.** The installation or update is initiated from an installed operating system executing on the target server itself.
- **Off-Target update.** The installation or update is initiated from a computing device interacting directly with the server’s Lenovo XClarity Controller.
- **Update Bundles (Service Packs).** Update Bundles (Service Packs) are bundled updates designed and tested to provide the interdependent level of functionality, performance, and compatibility. Update Bundles (Service Packs) are server machine-type specific and are built (with firmware and device driver updates) to support specific Windows Server, Red Hat Enterprise Linux (RHEL) and SUSE Linux Enterprise Server (SLES) operating system distributions. Machine-type-specific firmware-only Update Bundles (Service Packs) are also available.

Firmware updating tools

See the following table to determine the best Lenovo tool to use for installing and setting up the firmware:

Tool	Update Methods Supported	Core System Firmware Updates	I/O Devices Firmware Updates	Drive Firmware Updates	Graphical user interface	Command line interface	Supports Update Bundles (Service Packs)
Lenovo XClarity Provisioning Manager (LXPM)	In-band ² On-Target	✓			✓		
Lenovo XClarity Controller (XCC)	In-band ⁴ Out-of-band Off-Target	✓	Selected I/O devices	✓ ³	✓		✓
Lenovo XClarity Essentials OneCLI (OneCLI)	In-band Out-of-band On-Target Off-Target	✓	All I/O devices	✓ ³		✓	✓
Lenovo XClarity Essentials UpdateXpress (LXCE)	In-band Out-of-band On-Target Off-Target	✓	All I/O devices		✓		✓
Lenovo XClarity Essentials Bootable Media Creator (BoMC)	In-band Out-of-band Off-Target	✓	All I/O devices		✓ (BoMC application)	✓ (BoMC application)	✓
Lenovo XClarity Administrator (LXCA)	In-band ¹ Out-of-band ² Off-Target	✓	All I/O devices		✓		✓
Lenovo XClarity Integrator (LXCI) for VMware vCenter	Out-of-band Off-Target	✓	Selected I/O devices		✓		
Lenovo XClarity Integrator (LXCI) for Microsoft Windows Admin Center	In-band Out-of-band On-Target Off-Target	✓	All I/O devices		✓		✓

Tool	Update Methods Supported	Core System Firmware Updates	I/O Devices Firmware Updates	Drive Firmware Updates	Graphical user interface	Command line interface	Supports Update Bundles (Service Packs)
Lenovo XClarity Integrator (LXCI) for Microsoft System Center Configuration Manager	In-band On-Target	✓	All I/O devices		✓		✓
Notes: <ol style="list-style-type: none"> For I/O firmware updates. For BMC and UEFI firmware updates. Drive firmware update is only supported by the tools and methods below: <ul style="list-style-type: none"> XCC Bare Metal Update (BMU): In-band, and requires system reboot. Lenovo XClarity Essentials OneCLI: <ul style="list-style-type: none"> For drives supported by ThinkSystem V2 and V3 products (legacy drives): In-band, and does not require system reboot. For drives supported only by ThinkSystem V3 products (new drives): Staging to XCC and complete the update with XCC BMU (In-band, and requires system reboot.). Bare Metal Update (BMU) only. 							

• **Lenovo XClarity Provisioning Manager**

From Lenovo XClarity Provisioning Manager, you can update the Lenovo XClarity Controller firmware, the UEFI firmware, and the Lenovo XClarity Provisioning Manager software.

Note: By default, the Lenovo XClarity Provisioning Manager Graphical User Interface is displayed when you start the server and press the key specified in the on-screen instructions. If you have changed that default to be the text-based system setup, you can bring up the Graphical User Interface from the text-based system setup interface.

For additional information about using Lenovo XClarity Provisioning Manager to update firmware, see:

“Firmware Update” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>

• **Lenovo XClarity Controller**

If you need to install a specific update, you can use the Lenovo XClarity Controller interface for a specific server.

Notes:

- To perform an in-band update through Windows or Linux, the operating system driver must be installed and the Ethernet-over-USB (sometimes called LAN over USB) interface must be enabled.

For additional information about configuring Ethernet over USB, see:

“Configuring Ethernet over USB” section in the XCC documentation version compatible with your server at <https://pubs.lenovo.com/lxcc-overview/>

- If you update firmware through the Lenovo XClarity Controller, make sure that you have downloaded and installed the latest device drivers for the operating system that is running on the server.

For additional information about using Lenovo XClarity Controller to update firmware, see:

“Updating Server Firmware” section in the XCC documentation compatible with your server at <https://pubs.lenovo.com/lxcc-overview/>

- **Lenovo XClarity Essentials OneCLI**

Lenovo XClarity Essentials OneCLI is a collection of command line applications that can be used to manage Lenovo servers. Its update application can be used to update firmware and device drivers for your servers. The update can be performed within the host operating system of the server (in-band) or remotely through the BMC of the server (out-of-band).

For additional information about using Lenovo XClarity Essentials OneCLI to update firmware, see:

https://pubs.lenovo.com/lxce-onecli/onecli_c_update

- **Lenovo XClarity Essentials UpdateXpress**

Lenovo XClarity Essentials UpdateXpress provides most of OneCLI update functions through a graphical user interface (GUI). It can be used to acquire and deploy Update Bundles (Service Packs) update packages and individual updates. Update Bundles (Service Packs) contain firmware and device driver updates for Microsoft Windows and for Linux.

You can obtain Lenovo XClarity Essentials UpdateXpress from the following location:

<https://datacentersupport.lenovo.com/solutions/Invo-xpress>

- **Lenovo XClarity Essentials Bootable Media Creator**

You can use Lenovo XClarity Essentials Bootable Media Creator to create bootable media that is suitable for firmware updates, VPD updates, inventory and FFDC collection, advanced system configuration, FoD Keys management, secure erase, RAID configuration, and diagnostics on supported servers.

You can obtain Lenovo XClarity Essentials BoMC from the following location:

<https://datacentersupport.lenovo.com/solutions/Invo-bomc>

- **Lenovo XClarity Administrator**

If you are managing multiple servers using the Lenovo XClarity Administrator, you can update firmware for all managed servers through that interface. Firmware management is simplified by assigning firmware-compliance policies to managed endpoints. When you create and assign a compliance policy to managed endpoints, Lenovo XClarity Administrator monitors changes to the inventory for those endpoints and flags any endpoints that are out of compliance.

For additional information about using Lenovo XClarity Administrator to update firmware, see:

http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/update_fw.html

- **Lenovo XClarity Integrator offerings**

Lenovo XClarity Integrator offerings can integrate management features of Lenovo XClarity Administrator and your server with software used in a certain deployment infrastructure, such as VMware vCenter, Microsoft Admin Center, or Microsoft System Center.

For additional information about using Lenovo XClarity Integrator to update firmware, see:

<https://pubs.lenovo.com/lxci-overview/>

Configure the firmware

Several options are available to install and set up the firmware for the server.

Important: Lenovo does not recommend setting option ROMs to **Legacy**, but you can conduct this setting if necessary. Note that this setting prevents UEFI drivers for the slot devices from loading, which may cause negative side effects to Lenovo software, such as LXCA, OneCLI, and XCC. These side effects include but

are not limited to the inability to determine adapter card details, such as model name and firmware levels. For example, "ThinkSystem RAID 930-16i 4GB Flash" may be displayed as "Adapter 06:00:00". In some cases, the functionality on a specific PCIe adapter may not be enabled properly.

- **Lenovo XClarity Provisioning Manager (LXPM)**

From Lenovo XClarity Provisioning Manager, you can configure the UEFI settings for your server.

Notes: The Lenovo XClarity Provisioning Manager provides a Graphical User Interface to configure a server. The text-based interface to system configuration (the Setup Utility) is also available. From Lenovo XClarity Provisioning Manager, you can choose to restart the server and access the text-based interface. In addition, you can choose to make the text-based interface the default interface that is displayed when you start LXPM. To do this, go to **Lenovo XClarity Provisioning Manager → UEFI Setup → System Settings → <F1>Start Control → Text Setup**. To start the server with Graphic User Interface, select **Auto** or **Tool Suite**.

See the following documentations for more information:

- Search for the LXPM documentation version compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>
- *UEFI User Guide* at <https://pubs.lenovo.com/uefi-overview/>

- **Lenovo XClarity Essentials OneCLI**

You can use the config application and commands to view the current system configuration settings and make changes to Lenovo XClarity Controller and UEFI. The saved configuration information can be used to replicate or restore other systems.

For information about configuring the server using Lenovo XClarity Essentials OneCLI, see:

https://pubs.lenovo.com/lxce-onecli/onecli_c_settings_info_commands

- **Lenovo XClarity Administrator**

You can quickly provision and pre-provision all of your servers using a consistent configuration. Configuration settings (such as local storage, I/O adapters, boot settings, firmware, ports, and Lenovo XClarity Controller and UEFI settings) are saved as a server pattern that can be applied to one or more managed servers. When the server patterns are updated, the changes are automatically deployed to the applied servers.

Specific details about updating firmware using Lenovo XClarity Administrator are available at:

http://sysmgmt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/server_configuring.html

- **Lenovo XClarity Controller**

You can configure the management processor for the server through the Lenovo XClarity Controller Web interface, the command-line interface, or Redfish API.

For information about configuring the server using Lenovo XClarity Controller, see:

"Configuring the Server" section in the XCC documentation compatible with your server at <https://pubs.lenovo.com/lxcc-overview/>

Memory module configuration

Memory performance depends on several variables, such as memory mode, memory speed, memory ranks, memory population and processor.

Information about optimizing memory performance and configuring memory is available at the Lenovo Press website:

<https://lenovopress.lenovo.com/servers/options/memory>

In addition, you can take advantage of a memory configurator, which is available at the following site:

https://dcsc.lenovo.com/#/memory_configuration

Enable Software Guard Extensions (SGX)

Intel® Software Guard Extensions (Intel® SGX) operates under the assumption that the security perimeter includes only the internals of the CPU package, and leaves the DRAM untrusted.

Complete the following steps to enable SGX.

- Step 1. **Make sure** to refer to “[Memory module installation rules and order](#)” on page 34, which specifies whether your server supports SGX and lists the memory module population sequence for SGX configuration. (DIMM configuration must be at least 8 DIMMs per socket to support SGX.)
- Step 2. Restart the system. Before the operating system starts up, press the key specified in the on-screen instructions to enter the Setup Utility. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.)
- Step 3. Go to **System settings → Processors → UMA-Based Clustering** and disable the option.
- Step 4. Go to **System settings → Processors → Total Memory Encryption (TME)** and enable the option.
- Step 5. Save the changes, then go to **System settings → Processors → SW Guard Extension (SGX)** and enable the option.

RAID configuration

Using a Redundant Array of Independent Disks (RAID) to store data remains one of the most common and cost-efficient methods to increase server's storage performance, availability, and capacity.

RAID increases performance by allowing multiple drives to process I/O requests simultaneously. RAID can also prevent data loss in case of a drive failure by reconstructing (or rebuilding) the missing data from the failed drive using the data from the remaining drives.

RAID array (also known as RAID drive group) is a group of multiple physical drives that uses a certain common method to distribute data across the drives. A virtual drive (also known as virtual disk or logical drive) is a partition in the drive group that is made up of contiguous data segments on the drives. Virtual drive is presented up to the host operating system as a physical disk that can be partitioned to create OS logical drives or volumes.

An introduction to RAID is available at the following Lenovo Press website:

<https://lenovopress.lenovo.com/lp0578-lenovo-raid-introduction>

Detailed information about RAID management tools and resources is available at the following Lenovo Press website:

<https://lenovopress.lenovo.com/lp0579-lenovo-raid-management-tools-and-resources>

Intel VROC

Enabling Intel VROC

Before setting up RAID for NVMe drives, follow the below steps to enable VROC:

1. Restart the system. Before the operating system starts up, press the key specified in the on-screen instructions to enter the Setup Utility. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.)
2. Go to **System settings → Devices and I/O Ports → Intel® VMD technology → Enable/Disable Intel® VMD** and enable the option.
3. Save the changes and reboot the system.

Intel VROC configurations

Intel offers various VROC configurations with different RAID level and SSD support. See the following for more details.

Notes:

- Supported RAID levels varies by model. For the RAID level supported by SD650 V3, see [Technical specifications](#).
- For more information about acquiring and installing the activation key, see <https://fod.lenovo.com/lkms>.

Intel VROC configurations for PCIe NVMe SSDs	Requirements
Intel VROC Standard	<ul style="list-style-type: none"> • Supports RAID levels 0, 1, and 10 • Requires an activation key
Intel VROC Premium	<ul style="list-style-type: none"> • Supports RAID levels 0, 1, 5, and 10 • Requires an activation key
Bootable RAID	<ul style="list-style-type: none"> • RAID 1 only • 5th Gen Intel® Xeon® Scalable processors (formerly codenamed as Emerald Rapids, EMR)
Intel VROC configurations for SATA SSDs	Requirements
Intel VROC SATA RAID	<ul style="list-style-type: none"> • Supports RAID levels 0, 1, 5, and 10.

PSU configuration

Refer to the following section for more information on the PSU configurations.

SD650 V3 PSU configuration

PSU support matrix

Validate the power requirements for your configuration using the latest version of the Power Configurator to ensure that the number of power supplies selected are adequate for supporting your chassis configuration. The Power Configurator tool can be found at <https://datacentersupport.lenovo.com/solutions/Invo-lcp>.

CAUTION:

Failure to validate the configuration with the Power Configurator tool could result in system errors, failure to power on, or microprocessor throttling, and limiting system's ability to leverage all the microprocessor performance.

Notes:

- The tables below are based on nodes with all DIMM slots, PCIe slots, and hard disk drives populated.
- Installing different DWC trays in the DW612S enclosure requires specific PSU configuration, see [Guidance on mixing trays configuration for the DW612S enclosure](#).

Component	SD650 V3 support configurations
ThinkSystem 2400W (230V) v2 Platinum PSU	6 or 9 PSUs Mixing PSUs manufactured by different vendors is not supported.
ThinkSystem 2600W (230V) v2 Titanium PSU	6 or 9 PSUs
7200W Titanium DWC PSU	2 or 3 PSUs
High Power Midplane	Supported
Standard Midplane (Air PSU only)	Supported
SMM2	Supported

Power policy

Component	SD650 V3 power policy
ThinkSystem 2400W (230V) v2 Platinum PSU	6 PSU: 5+1 with OVS, or Non-redundancy 9 PSU: 8+1 without OVS
ThinkSystem 2600W (230V) v2 Titanium PSU	6 PSU: 5+1 with OVS, or Non-redundancy 9 PSU: 8+1 without OVS
7200W Titanium DWC PSU	2 PSUs configured as 5+1 redundancy with OVS, or Non-redundancy 3 PSUs configured as 8+1 redundancy without OVS

Note: OVS (Oversubscription) of the power system allows for more efficient use of the available system power.

Deploy the operating system

Several options are available to deploy an operating system on the server.

Available operating systems

- Red Hat Enterprise Linux
- SUSE Linux Enterprise Server

Complete list of available operating systems: <https://lenovopress.lenovo.com/osig>.

Tool-based deployment

• Multi-server

Available tools:

- Lenovo XClarity Administrator
http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/compute_node_image_deployment.html
- Lenovo XClarity Essentials OneCLI
https://pubs.lenovo.com/lxce-onecli/onecli_r_uxspi_proxy_tool
- Lenovo XClarity Integrator deployment pack for SCCM (for Windows operating system only)

https://pubs.lenovo.com/lxci-deploypack-sccm/dpsccm_c_endtoend_deploy_scenario

- **Single-server**

Available tools:

- Lenovo XClarity Provisioning Manager
“OS Installation” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>
- Lenovo XClarity Essentials OneCLI
https://pubs.lenovo.com/lxce-onecli/onecli_r_uxspi_proxy_tool
- Lenovo XClarity Integrator deployment pack for SCCM (for Windows operating system only)
https://pubs.lenovo.com/lxci-deploypack-sccm/dpsccm_c_endtoend_deploy_scenario

Manual deployment

If you cannot access the above tools, follow the instructions below, download the corresponding OS *Installation Guide*, and deploy the operating system manually by referring to the guide.

1. Go to <https://datacentersupport.lenovo.com/solutions/server-os>.
2. Select an operating system from the navigation pane and click **Resources**.
3. Locate the “OS Install Guides” area and click the installation instructions. Then, follow the instructions to complete the operation system deployment task.

Back up the server configuration

After setting up the server or making changes to the configuration, it is a good practice to make a complete backup of the server configuration.

Make sure that you create backups for the following server components:

- **Management processor**

You can back up the management processor configuration through the Lenovo XClarity Controller interface. For details about backing up the management processor configuration, see:

“Backing up the BMC configuration” section in the XCC documentation compatible with your server at <https://pubs.lenovo.com/lxcc-overview/>.

Alternatively, you can use the `save` command from Lenovo XClarity Essentials OneCLI to create a backup of all configuration settings. For more information about the `save` command, see:

https://pubs.lenovo.com/lxce-onecli/onecli_r_save_command

- **Operating system**

Use your backup methods to back up the operating system and user data for the server.

Enable Intel® On Demand

A processor is equipped with various computing capabilities. Basic capabilities are available at the initial processor installation, while others remain inactivated. As development environment and tasks evolve, computing demands may accelerate and require leverage of the previously inactivated processor capabilities. In such cases, user can select desired processor capabilities and activate them through Intel On Demand feature—a feature that allows user to customize processor capabilities according to environment and tasks at hand. The following section specifies system hardware and software requirement, Intel On Demand enabling and transferring procedures, and list of processor capabilities.

This documentation includes the following sections:

- “Supported processor” on page 248
- “Installation tool” on page 248
- Procedures for “Enabling Intel On Demand Features” on page 249
- Procedures for “Transferring Intel On Demand Features” on page 250
- XCC and LXCE OneCLI instructions for:
 - “Reading PPIN” on page 250
 - “Installing Intel On Demand to processor” on page 252
 - “Acquiring and uploading Intel On Demand State Report” on page 253
 - “Checking the Intel On Demand features installed in a processor” on page 255

Note: Depending on the model, the XCC Web GUI layout may be slightly different from the illustrations in this document.

Supported processor

Intel On Demand is only supported by Intel On Demand capable processors. For more information on Intel On Demand capable processors supported by SD650 V3, see <https://lenovopress.lenovo.com/lp1603-thinksystem-sd650-v3-server>.

Note: All processors in a system must be installed with identical Intel On Demand feature.

Installation tool

Intel On Demand can be installed via Lenovo XClarity Controller (XCC) and Lenovo XClarity Essentials OneCLI (LXCE OneCLI). After confirming that your processor supports Intel On Demand, you also need to make sure the XCC and LXCE OneCLI installed in your system supports installing Intel On Demand.

1. Check if Lenovo XClarity Controller (XCC) supports installing Intel On Demand (two methods provided):

- **Via XCC WebGUI**

Go to **BMC Configuration → License**, if there is a section named **On Demand Capabilities for Intel CPU** in the page, it indicates that current XCC supports installing Intel On Demand, otherwise you need to update XCC firmware to the latest version to ensure it supports installing Intel On Demand.

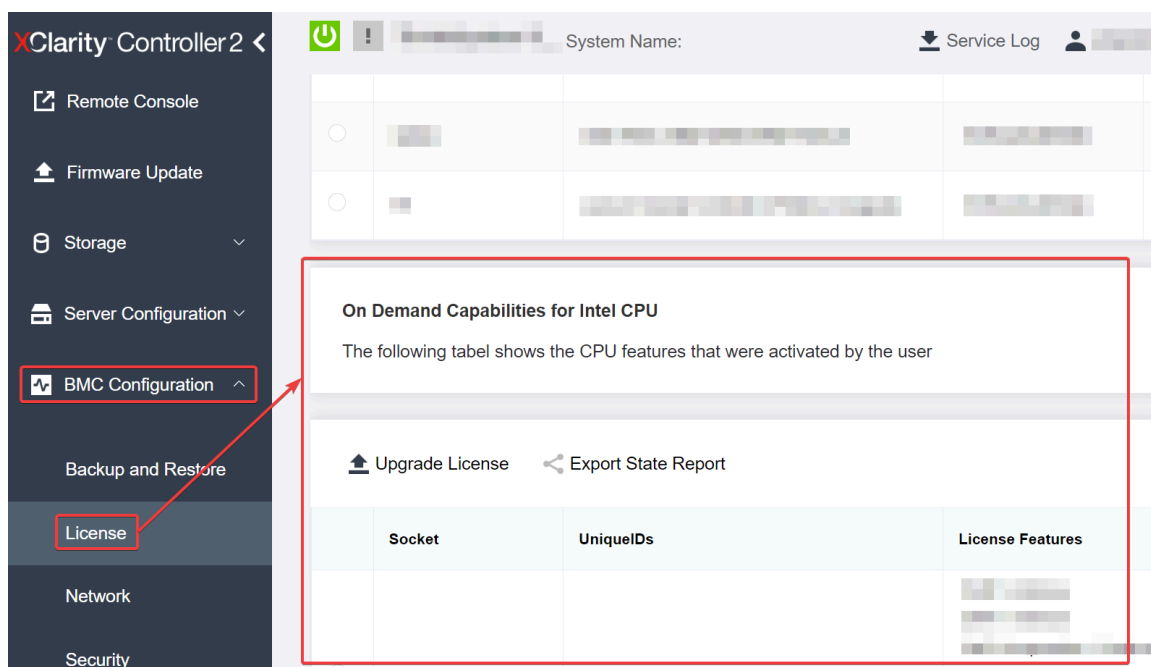


Figure 244. On Demand Capabilities for Intel CPU in XCC Web GUI

- **Via XCC REST API**

- Use the **GET** method with the following Request URL:
GET https://bmc_ip/redfish/v1/LicenseService/Licenses/
- In the response JSON object, the Members field includes the API such as `/redfish/v1/LicenseService/Licenses/CPUX_OnDemandCapability`, where X is the CPU numbering, it indicates that current XCC supports installing Intel On Demand, otherwise you need to update XCC firmware to the latest version to ensure it supports installing Intel On Demand.

For example:

```
"Members": [
  {
    "@odata.id": "/redfish/v1/LicenseService/Licenses/CPU1_OnDemandCapability"
  },
  {
    "@odata.id": "/redfish/v1/LicenseService/Licenses/CPU2_OnDemandCapability"
  }
]
```

- Check if LXCE OneCLI supports installing Intel On Demand

- LXCE OneCLI version must be at 4.2.0 or above.

Enabling Intel On Demand Features

- Select the Intel On Demand features that meets your workload needs, see [“Intel On Demand Features” on page 256](#).
- After completing ordering the features, you will receive Authorization Code via e-mail.
- PPIN is a mandatory information for enabling the features. Read the PPIN of the processor that is to be installed with the features. See [“Reading PPIN” on page 250](#).
- Go to <https://fod.lenovo.com/kms> and input the Authorization Code to acquire the Activation Key.
- In the website, input Machine Type, Machine serial number, and PPIN.
- The website will generate the Activation Key. Download the Activation Key.

7. Install the features to the processor with the Activation Key via XCC or LXCE OneCLI. See [“Installing Intel On Demand to processor” on page 252](#).

Note: If more than one Activation Keys are acquired, it is mandatory to install them in the sequential order they were acquired. For example, start with installing the first acquired key, and proceed with the second acquired key, and so on.

8. AC cycle the server.
9. (Optional) Upload Intel On Demand State Report. See [“Acquiring and uploading Intel On Demand State Report” on page 253](#).

The State Report represents the current configuration state of the Intel On Demand capable processors. Lenovo accepts State Reports from customers to calibrate the current state of the Intel On Demand capable processors.

10. To see the features installed in a processor, see [“Checking the Intel On Demand features installed in a processor” on page 255](#).

For reference, see https://pubs.lenovo.com/lenovo_fod.

Transferring Intel On Demand Features

After replacing a processor, you may need to transfer the features from the defective processor to the new processor. Complete the following steps to transfer features to new processor.

1. Before removing the defective processor from the system, read the PPIN of the defective processor. See [“Reading PPIN” on page 250](#).
2. After installing the new processor, read the PPIN of the new processor. See [“Reading PPIN” on page 250](#).
3. Go to <https://fod.lenovo.com/lkms> and input the PPIN of the defective processor. (Input PPIN in the UID section.)
4. Select the features to be transferred.
5. Input the PPIN of the new processor.
6. The website will generate the new Activation Key. Download the new Activation Key. See [“Installing Intel On Demand to processor” on page 252](#).
7. Install the features to the new processor with the new Activation Key via XCC or LXCE OneCLI.
8. AC cycle the server.
9. (Optional) Upload Intel On Demand State Report. See [“Acquiring and uploading Intel On Demand State Report” on page 253](#).

The State Report represents the current configuration state of the Intel On Demand capable processors. Lenovo accepts State Reports from customers to calibrate the current state of the Intel On Demand capable processors.

10. To see the features installed in a processor, see [“Checking the Intel On Demand features installed in a processor” on page 255](#).

For reference, see https://pubs.lenovo.com/lenovo_fod.

Reading PPIN

Protected Processor Inventory Number, or PPIN, is a mandatory information for enabling Intel On Demand. PPIN can be read via XCC Web GUI, XCC REST API, and LXCE OneCLI. See the following for more information.

Reading PPIN via XCC Web GUI

Open XCC Web GUI, go to **Inventory page** → **CPU tab** → **Expand** → **PPIN**

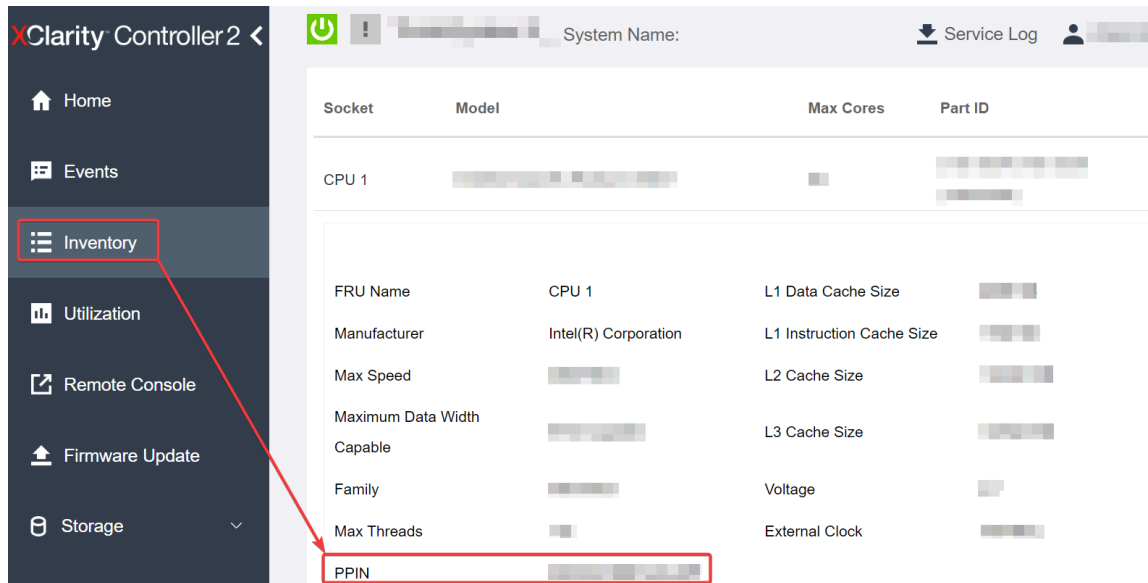


Figure 245. Reading PPIN via XCC Web GUI

Reading PPIN via XCC REST API

1. Use the **GET** method with the following Request URL:
GET `https://bmc_ip/redfish/v1/Systems/1/Processors`
For example:
GET `https://bmc_ip/redfish/v1/Systems/1/Processors`
2. In the response JSON object, the Members field shows reference link to an element of processor resource.

For example:

```
"Members":[
{
  @odata.id: "/redfish/v1/Systems/1/Processors/1"
},
{
  @odata.id: "/redfish/v1/Systems/1/Processors/2"
}
],
```

3. Select the processor you need to read the PPIN from. Use the **GET** method with the following Request URL, where x is the CPU numbering:
GET `https://bmc_ip/redfish/v1/Systems/1/Processors/x`
For example, to read Processor 1 PPIN, see the following:
GET `https://bmc_ip/redfish/v1/Systems/1/Processors/1`
4. In the response JSON object, the ProcessorId field shows the ProtectedIdentificationNumber field, which is the PPIN info of the requested CPU.

For example:

```
"ProcessorId":{
  "ProtectedIdentificationNumber":"1234567890xxxxyy"
},
```

Reading PPIN via LXCE OneCLI

Input the following command:

```
OneCli.exe fod showppin -b XCC_USER:XCC_PASSWORD@XCC_HOST
```

The output shows PPIN information. For example:

Machine Type: 7D75
Serial Number: 7D75012345
FoD PPIN result:

```
=====
| Socket ID |      PPIN      |
| Processor 1 | 1234567890xxxxyy |
| Processor 2 | 9876543210zzzyyy |
=====
```

Installing Intel On Demand to processor

Install Intel On Demand features to the processor with the Activation Key downloaded from the <https://fod.lenovo.com/lkms> via XCC Web GUI, XCC REST API or LXCE OneCLI.

Use XCC Web GUI to install Intel On Demand

1. Open XCC Web GUI, go to **BMC Configuration → License → On Demand Capabilities for Intel CPU → Upgrade License → Browse → Import** to upload the Activation Key

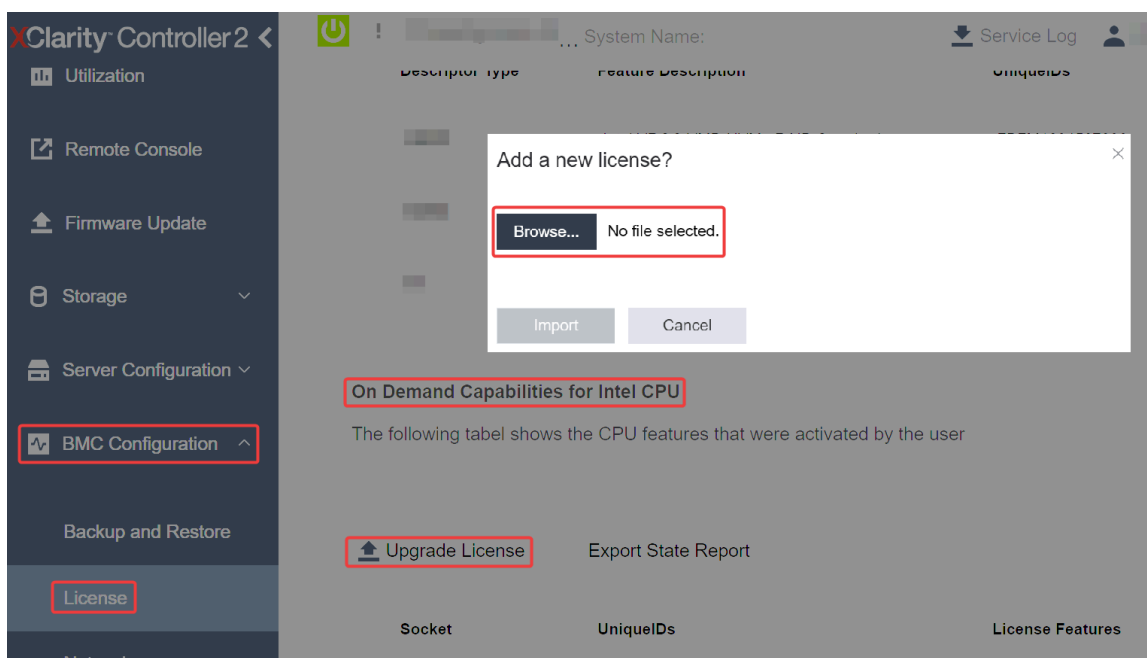


Figure 246. Uploading Activation Key via XCC Web GUI

2. If the installation is successful, the Web GUI will show a pop-up window with the message “License key upgraded successfully. The features will be activated on the processor after system power cycle”.

Otherwise, see “[Enable Intel® On Demand Troubleshooting](#)” on page 257.

Use XCC REST API to install Intel On Demand

1. Use the **POST** method with the following Request URL:
POST https://bmc_ip/redfish/v1/LicenseService/Licenses
2. Transfer Activation Key to base64 string at first and fill it into the LicenseString field as POST data.

```
{
  "LicenseString": ""
}
```

3. If the installation is successful, XCC REST API show the message “License key upgraded successfully. The features will be activated on the processor after system power cycle”.

Otherwise, see “[Enable Intel® On Demand Troubleshooting](#)” on page 257.

Use LXCE OneCLI to install Intel On Demand

Input the following command, where <key_file> specifies the Activation Key:

```
OneCli.exe fod install --keyfile <key_file>
```

If successfully installed, the response will show:

```
Successfully install key
```

Call Lenovo support if the response shows the following:

```
Failed to install key
```

Acquiring and uploading Intel On Demand State Report

After completing enabling or transferring Intel On Demand, acquire and upload the State Report via XCC Web GUI, XCC REST API, and LXCE OneCLI. See the following for more information.

Use XCC Web GUI to upload State Report

1. Open XCC Web GUI, go to **BMC Configuration → License → On Demand Capabilities for Intel CPU → Choose CPU → Export State Report**

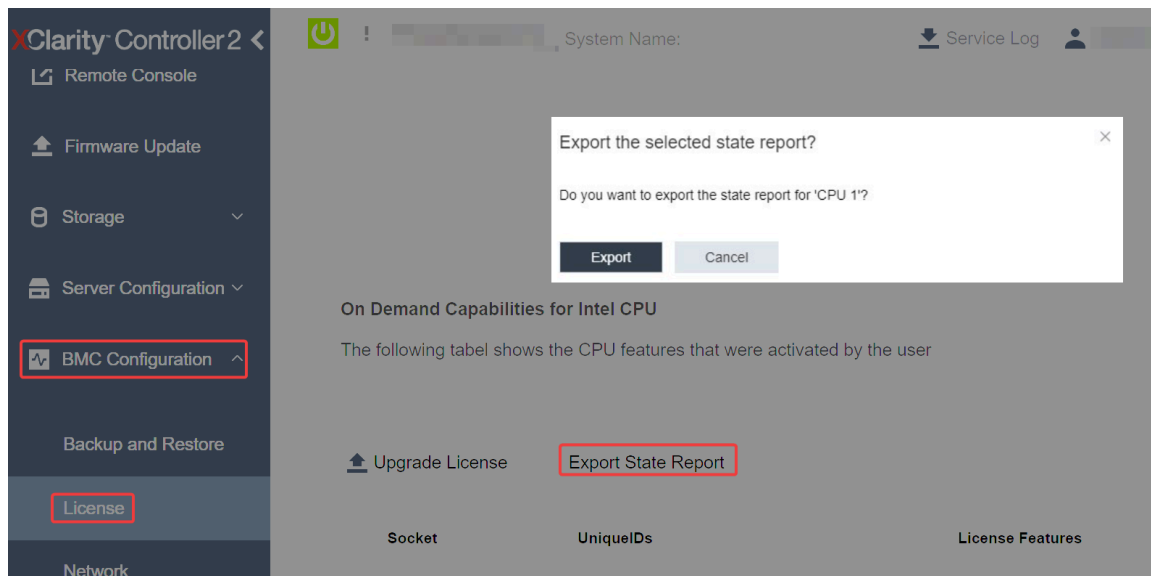


Figure 247. Export State Report via XCC Web GUI

2. Upload State Report via “On Demand Feedback” section in <https://fod.lenovo.com/lkms>.

Use XCC REST API to upload State Report

1. Use the **GET** method with the following Request URL to retrieve CPU State Report API, where X is the CPU numbering:
GET https://bmc_ip/redfish/v1/LicenseService/Licenses/CPUX_OnDemandCapability
For example, to retrieve CPU 1 State Report API, see the following:
GET https://bmc_ip/redfish/v1/LicenseService/Licenses/CPU1_OnDemandCapability
2. In the response JSON object, the response of the target field of the `LenovoLicense.ExportStateReport` field is the CPU State Report API, where X is the CPU numbering:

```

"Actions": {
  "Oem": {
    "#LenovoLicense.ExportStateReport": {
      "title": "ExportStateReport",
      "target": "/redfish/v1/LicenseService/Licenses/CPUX_OnDemandCapability/Actions/Oem/LenovoLicense.ExportStateReport"
    }
  }
},

```

In the following example, the response of the target field is the CPU 1 State Report API. Copy the CPU 1 State Report API.

```

"Actions": {
  "Oem": {
    "#LenovoLicense.ExportStateReport": {
      "title": "ExportStateReport",
      "target": "/redfish/v1/LicenseService/Licenses/CPU1_OnDemandCapability/Actions/Oem/LenovoLicense.ExportStateReport"
    }
  }
},

```

3. Retrieve the State Report.

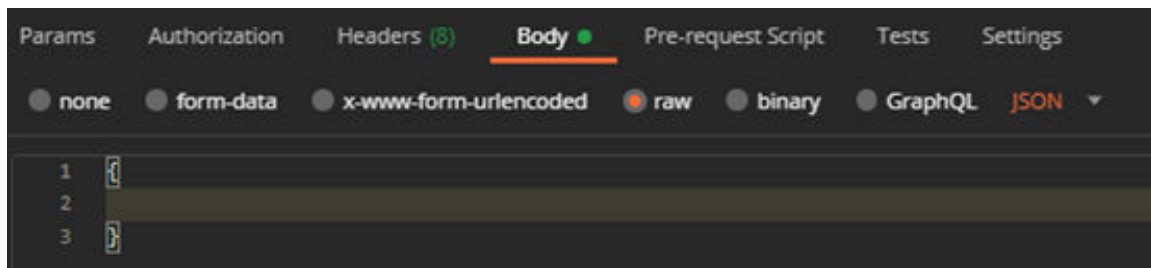
- Use the **POST** method with the following Request URL with CPU State Report API to retrieve the State Report, where X is the CPU numbering:

POST https://bmc_ip/redfish/v1/LicenseService/Licenses/CPUX_OnDemandCapability/Actions/Oem/LenovoLicense.ExportStateReport

For example, to retrieve CPU 1 State Report, see the following:

POST https://bmc_ip/redfish/v1/LicenseService/Licenses/CPU1_OnDemandCapability/Actions/Oem/LenovoLicense.ExportStateReport

- Use an empty JSON object as POST data. When using API tool such as Postman, fill an empty JSON object in **Body** → **Raw** → **JSON**, fill a NULL object '{}' in a JSON file.



- In the response, retrieve the State Report in the stateReports field.

```

{
  "stateReports": [
    {
      "syntaxVersion": "1.0",
      "timestamp": "",
      "objectId": "",
      "hardwareComponentData": [
        {
          "hardwareId": {
            "type": "PPIN",
            "value": ""
          },
          "stateCertificate": {
            "pendingCapabilityActivationPayloadCount": ,
            "value": ""
          },
          "hardwareType": "CPU"
        }
      ]
    }
  ]
}

```

```
}
]
}
```

5. Upload State Report via “On Demand Feedback” section in <https://fod.lenovo.com/lkms>.

Use LXCE OneCLI to upload State Report

1. Acquire State Report with the following command:
`OneCli.exe fod exportreport -b XCC_USER:XCC_PASSWORD@XCC_HOST`
2. Upload State Report with the following command:
`OneCli.exe fod uploadreport --file CPU1_xxxxxx_StateReport.json --kmsid KMS_USER:KMS_PASSWORD`
Where:
CPU1_xxxxxx_StateReport.json is the file name downloaded from the **fod exportreport** command in Step 1.
KMS_USER and KMS_PASSWORD are your ID and password on the <https://fod.lenovo.com/lkms>.

Checking the Intel On Demand features installed in a processor

You can check the Intel On Demand features installed in a processor via XCC Web GUI, XCC REST API, and LXCE OneCLI. See the following for more information.

Note: If the processor has not been installed with any license, it would not appear in the **On Demand Capabilities for Intel CPU** section in XCC Web GUI.

Use XCC Web GUI to check the Intel On Demand features installed in a processor

Go to **BMC Configuration → License → On Demand Capabilities for Intel CPU → Choose CPU → License Features**, where the installed features are listed.

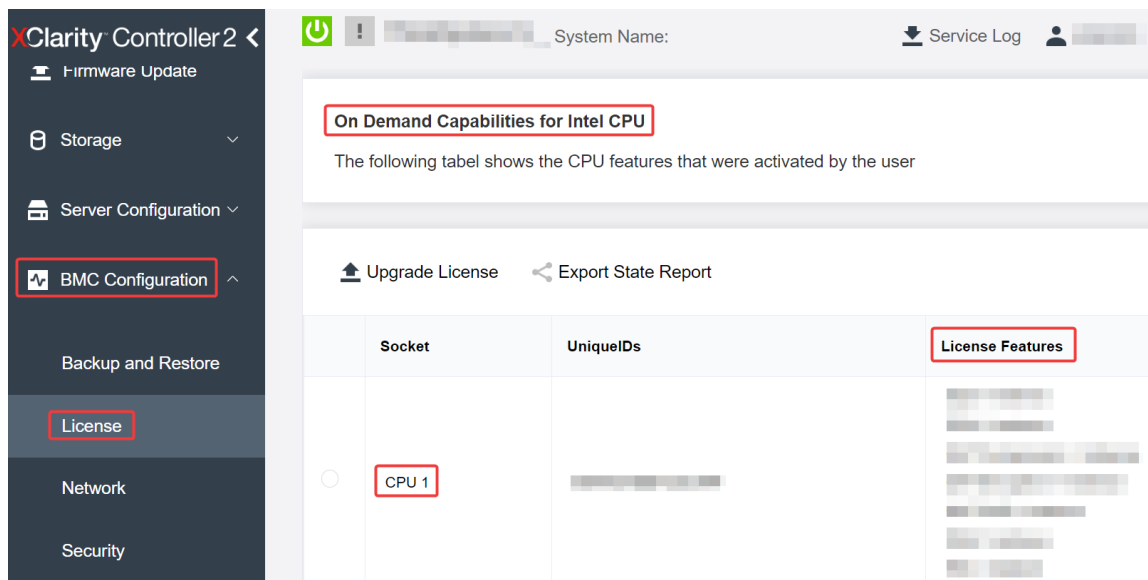


Figure 248. Checking the Intel On Demand features installed in a processor in XCC Web GUI

Use XCC REST API to check the Intel On Demand features installed in a processor

1. Use the **GET** method with the following Request URL to retrieve Intel On Demand features installed on CPU X, where X is the CPU numbering:
`GET https://bmc_ip/redfish/v1/LicenseService/Licenses/CPUX_OnDemandCapability`
For example, to retrieve Intel On Demand features installed on CPU 1, see the following:

GET https://bmc_ip/redfish/v1/LicenseService/Licenses/CPU1_OnDemandCapability

2. In the response JSON object, the FeatureList field contains the Intel On Demand features installed in this processor.

```
"Oem": {
  "Lenovo": {
    "FeatureList": []
    "@odata.type": ""
  }
},
```

Use LXCE OneCLI to check the Intel On Demand features installed in a processor

1. Check installed features with the following command:
OneCli.exe fod report -b XCC_USER:XCC_PASSWORD@XCC_HOST
2. The output shows all license, including Intel On Demand features. For example:

FoD Reports result:						
Feature Type	Key ID	Status	Description Feature List	User Reminding	Expired Date	
N/A	CPU1_OnDemandCapability	StandbyOffline	DSA 4 instances, IAA 4 instances	N/A	N/A	
N/A	CPU2_OnDemandCapability	Enabled	DSA 4 instances, IAA 4 instances	N/A	N/A	
004a	XCC2_Platinum	Enabled	Lenovo XClarity Controller 2 Platinum Upgrade	N/A	N/A	

Succeed.

Intel On Demand Features

Intel On Demand features are listed below. Supported features vary by product, for more information, see <https://lenovopress.lenovo.com/lp1603-thinksystem-sd650-v3-server>.

Features

- **Intel Quick Assist Technology (Intel QAT)¹**

Intel® QAT which helps free up processor cores by offloading encryption, decryption, and compression so systems can serve a larger number of clients or use less power. With Intel QAT, 4th gen Intel Xeon Scalable processors are the highest performance CPUs that can compress and encrypt in a single data flow.

- **Intel Dynamic Load Balancer (Intel DLB)²**

Intel DLB is a hardware managed system of queues and arbiters connecting producers and consumers. It is a PCI device envisaged to live in the server CPU uncore and can interact with software running on cores, and potentially with other devices.

- **Intel Data Streaming Accelerator (Intel DSA)¹**

Intel DSA drives high performance for storage, networking, and data-intensive workloads by improving streaming data movement and transformation operations. Designed to offload the most common data movement tasks that cause overhead in data center-scale deployments, Intel DSA helps speed up data movement across the CPU, memory, caches, all attached memory, storage, and network devices.

- **Intel In Memory Accelerator (Intel IAA)¹**

Intel IAA helps run database and analytics workloads faster, with potentially greater power efficiency. This built-in accelerator increases query throughput and decreases the memory footprint for in-memory database and big data analytics workloads. Intel IAA is ideal for in-memory databases, and source databases.

- **Intel Software Guard Extensions (Intel SGX) 512 GB³**

Intel® SGX offers hardware-based memory encryption that isolates specific application code and data in memory. Intel SGX allows user-level code to allocate private regions of memory, called enclaves, which are designed to be protected from processes running at higher privilege levels.

References

- ¹*Achieve Performance Advantage with Intel oneAPI, AI Tools, and 4th Gen Intel® Xeon® Scalable Processors Featuring Built-in Accelerator Engines*, (n.d.). Intel. <https://www.intel.com/content/www/us/en/developer/articles/technical/performance-advantage-with-xeon-and-oneapi-tools.html>
- ²*Intel® Dynamic Load Balancer*, (2023, May 23) Intel. <https://www.intel.com/content/www/us/en/download/686372/intel-dynamic-load-balancer.html>
- ³*Intel® Software Guard Extensions (Intel® SGX)*, (n.d.) Intel. <https://www.intel.com/content/www/us/en/architecture-and-technology/software-guard-extensions.html>

Enable Intel® On Demand Troubleshooting

Refer to the table below for Intel On Demand installation error messages and user actions.

Table 23. Intel On Demand installation messages and user actions

Message	User Action
License key upgraded successfully. The features will be activated on the processor after system power cycle.	You can activate Intel On Demand after performing one system power cycle.
The activation key format is invalid	Check if you have uploaded the correct Activation Key file. If the error persists, contact Lenovo support.
Invalid processor PPIN in Activation key	Contact Lenovo support.
The license was installed in the processor already	You have already installed this activation key. Check if the activation key you uploaded is correct.
Not enough NVRAM space in the processor	Contact Lenovo support.
Internal error	Contact Lenovo support.
Cold reset needed before next provisioning	If you want to continue installing an activation key, perform a system power cycle at first.
Unable to provision LAC due to FEH error	Contact Lenovo support.
Unable to import license in shutdown state, please try again after power on.	Power on the system before installing Intel On Demand.
Unable to import license due to On Demand Capabilities information is in progress. Please try again later.	If you want to continue installing an activation key, try again later.

Guidance on mixing trays configuration for the DW612S enclosure

Refer to the following section for more information on installing various direct water cooling trays into the DW612S enclosure.

DWC trays supported by the DW612S enclosure

1. SD650 V2

2. SD650-N V2
3. SD650 V3
4. SD650-I V3
5. SD650-N V3
6. SD665 V3
7. SD665-N V3

Mixing tray guidance

DW612S enclosure allows mixing trays configuration, which is installing different supporting trays in the same DW612S enclosure. Mixing trays configuration must meet the following requirements.

Mixing tray requirements

1. Enclosure total power consumption is reviewed and approved in Lenovo Capacity Planner (LCP): <https://datacentersupport.lenovo.com/solutions/Invo-lcp>.
2. SMM2 is updated to the latest firmware.
3. If SD665-N V3 or SD650-N V3 is installed in the enclosure, only 2600W or 7200W PSUs are supported.
4. If SD650 V2 or SD650 V3 is installed in the enclosure and shared I/O configuration is enabled, the shared I/O special node power on/off sequence must be followed. See [Shared I/O configuration specific power on and power off sequence](#).
5. Install the tray starting from enclosure bottom to top (node 1-2 to node 11-12). The tray placement order in the enclosure should be:

SD665-N V3 → SD650-N V3 → SD665 V3 → SD650-I V3 → >SD650-N V2 → SD650 V3 → SD650 V2

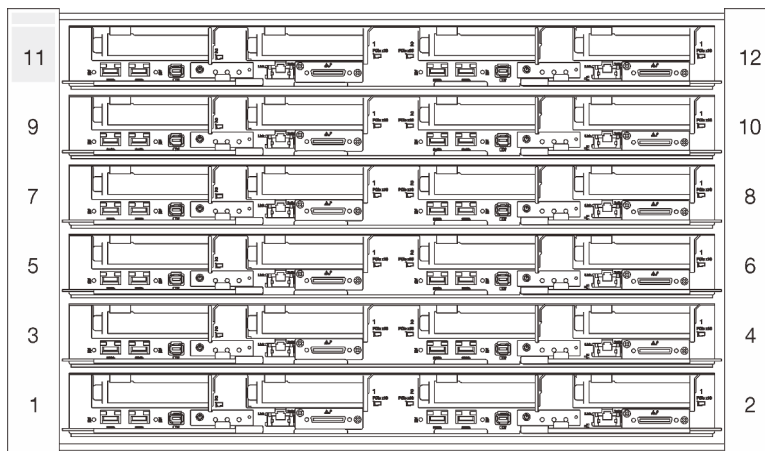


Figure 249. Front view of DW612S enclosure installed with six SD650 V3 tray

6. Refer to Lenovo Press <https://lenovopress.lenovo.com/> for individual tray's maximum inlet water temperature supported and minimum flow rate required. Set CDU temperature setpoint to ensure the lowest maximum supported inlet water is not exceeded. Set CDU flow setpoint to ensure the largest minimum flow rate is delivered to every tray.
7. If encounter system error in mixing trays configurations, check if the system meets the requirements above. If system error remains, contact Lenovo technician.

Shared I/O configuration specific power on and power off sequence

- When viewed from the front of the tray, the right node is installed with main adapter, while the left node is either installed with the auxiliary adapter kit or connected to main adapter with the shared I/O cable.

- Power on sequence: first, power on the right node; then, power on the left node.
- Power off sequence: first, power off the left node; then, power off the right node.

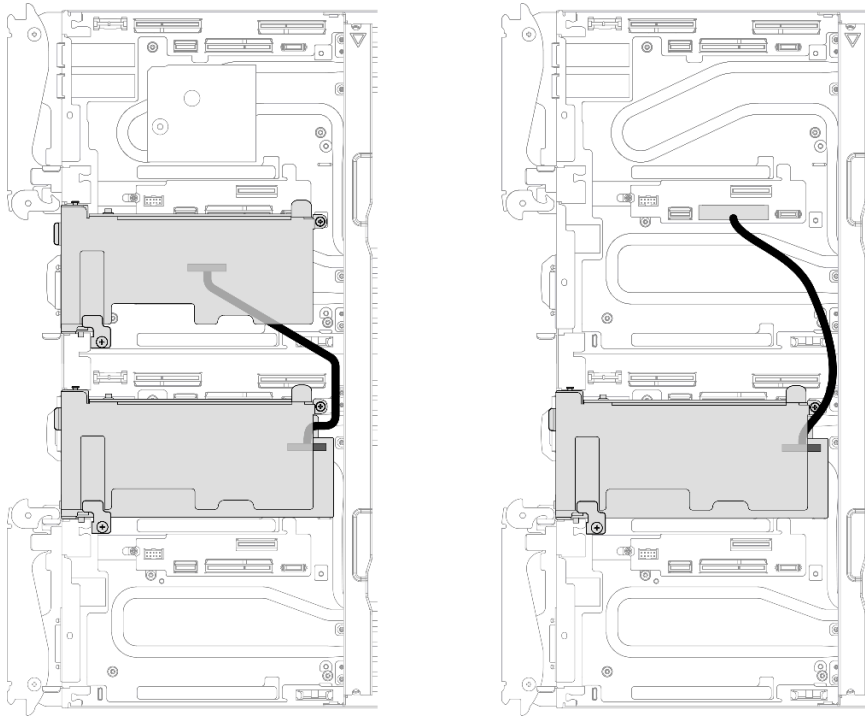


Figure 250. Left: shared I/O with auxiliary adapter kit, right: shared I/O with cable

Chapter 8. Problem determination

Use the information in this section to isolate and resolve issues that you might encounter while using your server.

Lenovo servers can be configured to automatically notify Lenovo Support if certain events are generated. You can configure automatic notification, also known as Call Home, from management applications, such as the Lenovo XClarity Administrator. If you configure automatic problem notification, Lenovo Support is automatically alerted whenever a server encounters a potentially significant event.

To isolate a problem, you should typically begin with the event log of the application that is managing the server:

- If you are managing the server from the Lenovo XClarity Administrator, begin with the Lenovo XClarity Administrator event log.
- If you are using some other management application, begin with the Lenovo XClarity Controller event log.

Web resources

- **Tech tips**

Lenovo continually updates the support website with the latest tips and techniques that you can use to solve issues that your server might encounter. These Tech Tips (also called retain tips or service bulletins) provide procedures to work around issues or solve problems related to the operation of your server.

To find the Tech Tips available for your server:

1. Go to <http://datacentersupport.lenovo.com> and navigate to the support page for your server.
2. Click on **How To's** from the navigation pane.
3. Click **Article Type → Solution** from the drop-down menu.

Follow the on-screen instructions to choose the category for the problem that you are having.

- **Lenovo Data Center Forum**

- Check https://forums.lenovo.com/t5/Datacenter-Systems/ct-p/sv_eg to see if someone else has encountered a similar problem.

Event logs

An *alert* is a message or other indication that signals an event or an impending event. Alerts are generated by the Lenovo XClarity Controller or by UEFI in the servers. These alerts are stored in the Lenovo XClarity Controller Event Log. If the server is managed by the Chassis Management Module 2 or by the Lenovo XClarity Administrator, alerts are automatically forwarded to those management applications.

Note: For a listing of events, including user actions that might need to be performed to recover from an event, see the *Messages and Codes Reference*, which is available at https://pubs.lenovo.com/sd650-v3/pdf_files.

Lenovo XClarity Administrator event log

If you are using Lenovo XClarity Administrator to manage server, network, and storage hardware, you can view the events from all managed devices through the XClarity Administrator.

Logs

Severity	Serviceability	Date and Time	System	Event	System Type	Source ID
Warning	Support	Jan 30, 2017, 7:48:07 AM	Chassis114:...	Node Node 08 device	Chassis	Jan 30, 20
Warning	Support	Jan 30, 2017, 7:48:07 AM	Chassis114:...	Node Node 02 device	Chassis	Jan 30, 20
Warning	User	Jan 30, 2017, 7:48:07 AM	Chassis114:...	I/O module IO Module	Chassis	Jan 30, 20
Warning	User	Jan 30, 2017, 7:48:07 AM	Chassis114:...	Node Node 08 incoming	Chassis	Jan 30, 20

Figure 251. Lenovo XClarity Administrator event log

For more information about working with events from XClarity Administrator, see:

http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/events_vieweventlog.html

System Management Module 2 event log

The SMM2 event log contains all events received from all nodes in the enclosure. In addition, it includes events related to power and cooling.

Note: New SMM2 events are appended to the end of the event log. The log can store up to 4, 096 events; you must clear the log to add additional events.

Event Log

To sort system event logs, click the 'Date/Time'.

System Event Count (Current / Maximum) 8 / 4090

Event ID	Severity	Date/Time ↓	Description
0x21070841	✓	2017-04-18 13:30:42 (UTC+0000)	NODE2_PRESENT: Slot Or Connector sensor, Informational was asserted
0x080707a5	✓	2017-04-18 13:30:42 (UTC+0000)	PS2_EPOW: Power Supply sensor, Monitor was asserted
0x080701aa	!	2017-04-18 13:30:42 (UTC+0000)	PSU_Policy_Lost: Power Supply sensor, transition to Non-Critical from OK was asserted
0x086f03e1	✓	2017-04-18 13:30:42 (UTC+0000)	PS2: Power Supply sensor, Power Supply input lost (AC/DC) was asserted
0x086f00e1	✓	2017-04-18 13:30:42 (UTC+0000)	PS2: Power Supply sensor, Presence detected was asserted
0x086f00e0	✓	2017-04-18 13:30:42 (UTC+0000)	PS1: Power Supply sensor, Presence detected was asserted
0x1d6f0030	✓	2017-04-18 13:30:42 (UTC+0000)	SMM_POWER_ON: System Boot Initiated sensor, Initiated by power up was asserted
0x106f0202	✓	2017-04-18 13:29:41 (UTC+0000)	EvtLogDisabled: Event Logging Disabled sensor, Log Area Reset/Cleared was asserted

1

Figure 252. SMM2 event log

Lenovo XClarity Controller event log

The Lenovo XClarity Controller monitors the physical state of the server and its components using sensors that measure internal physical variables such as temperature, power-supply voltages, fan speeds, and component status. The Lenovo XClarity Controller provides various interfaces to systems management software and to system administrators and users to enable remote management and control of a server.

The Lenovo XClarity Controller monitors all components of the server and posts events in the Lenovo XClarity Controller event log.

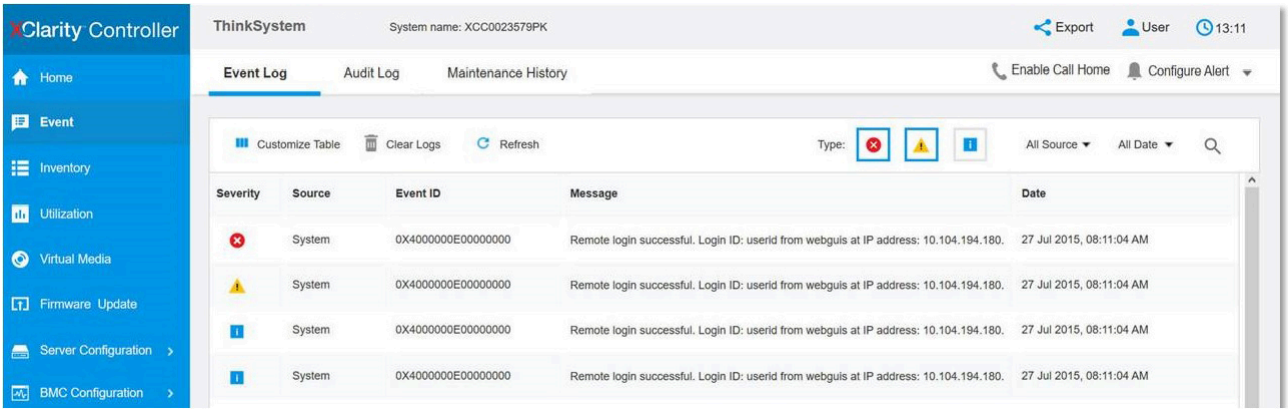


Figure 253. Lenovo XClarity Controller event log

For more information about accessing the Lenovo XClarity Controller event log, see:

“Viewing Event Logs” section in the XCC documentation compatible with your server at <https://pubs.lenovo.com/lxcc-overview/>

Troubleshooting by system LEDs and diagnostics display

See the following section for information on available system LEDs and diagnostics display.

Front LEDs

The following illustration shows LEDs on the front of the solution. By viewing the status of LEDs, you can often identify the source of the error.

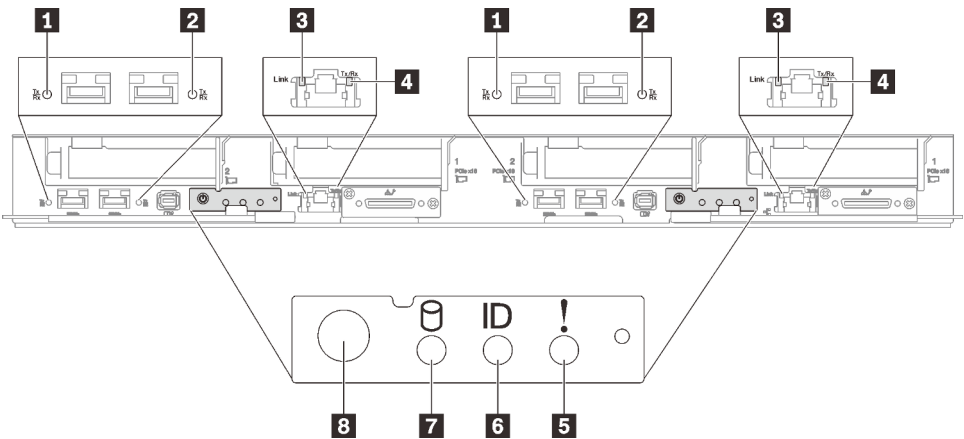


Figure 254. SD650 V3 tray front LEDs

Table 24. Front LEDs

1 25 Gb Ethernet port link and activity LED (left) (green)	5 System-error LED (yellow)
2 25 Gb Ethernet port link and activity LED (right) (green)	6 Identification LED (blue)

Table 24. Front LEDs (continued)

3 1 Gb Ethernet port link LED (green)	7 Drive activity LED (green)
4 1 Gb Ethernet port activity LED (green)	8 Node power button with LED (green)

1 25 Gb Ethernet port link and activity LED (green): Use this green LED to distinguish the network status.

Off: The network is disconnected.

Blinking: The network is accessing.

On: The network is established.

3 1 Gb Ethernet port link LED (green): Use this green LED to distinguish the network status.

Off: The network link is disconnected.

On: The network link is established.

4 1 Gb Ethernet port activity LED (green): Use this green LED to distinguish the network status.

Off: The node is disconnected from a LAN.

Blinking: The network is connected and active.

5 System-error LED (yellow): When this yellow LED is lit, it indicates that a system error has occurred.

6 Identification LED (blue): Use this blue LED to visually locate the node among other nodes. This LED is also used as a presence detection button. You can use Lenovo XClarity Administrator to light this LED remotely.

7 Drive activity LED (green): If the LED is lit, it indicates that the drive is powered, but not actively reading or writing data. If the LED is flashing, the drive is being accessed.

8 Node power button with LED (green): Press this button to turn the node on and off manually. The states of the power LED are as follows:

Off: Power is not present or the power supply, or the LED itself has failed.

Flashing rapidly (4 times per second): The node is turned off and is not ready to be turned on. The power button is disabled. This will last approximately 5 to 10 seconds.

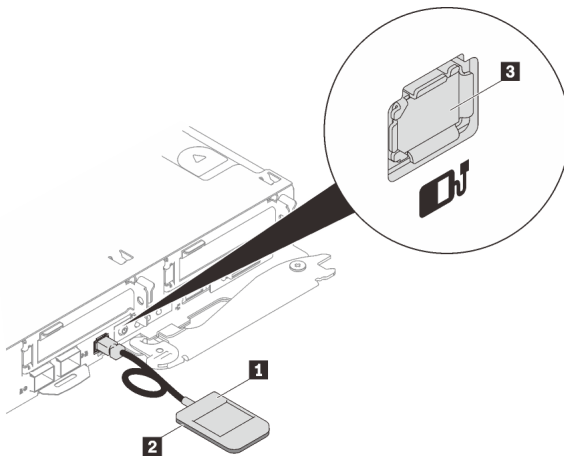
Flashing slowly (once per second): The node is turned off and is ready to be turned on. You can press the power button to turn on the node.

On: The node is turned on.

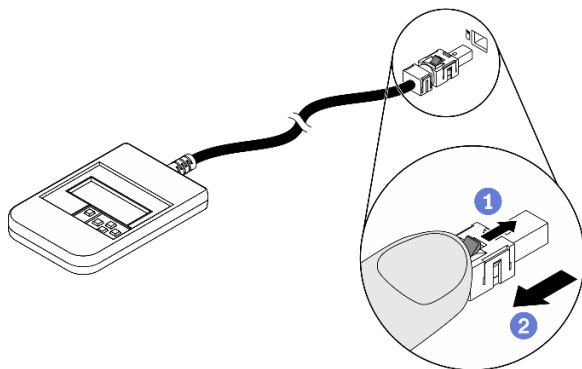
External Diagnostics Handset

The External Diagnostics Handset is an external device that is connected to the server with a cable, and it allows quick access to system information such as errors, system status, firmware, network, and health information.

Location of the External Diagnostics Handset

Location	Callouts
<p>The External Diagnostics Handset is connected to the server with an external cable.</p> 	<p>1 External Diagnostics Handset</p>
	<p>2 Magnetic bottom With this component, the diagnostic handset can be attached to the top or side of the rack with hands spared for service tasks.</p>
	<p>3 External diagnostics connector This connector is located on the front of the server, and is used to connect an External Diagnostics Handset.</p>

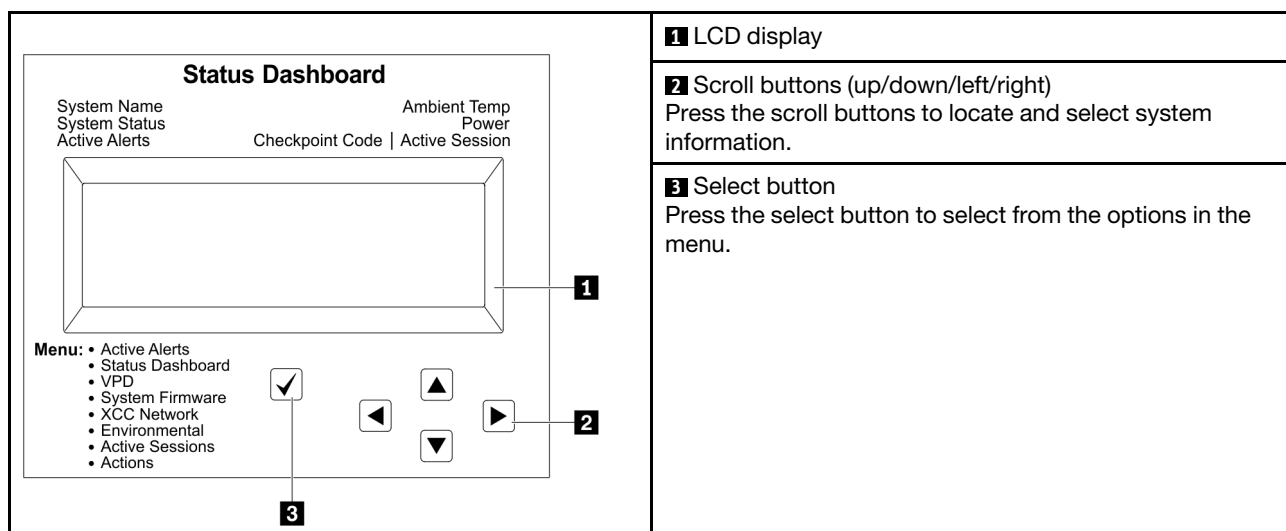
Note: When unplugging the External Diagnostics Handset, see the following instructions:



- 1 Press the plastic clip on the plug forward.
- 2 Hold the clip and remove the cable from the connector.

Display panel overview

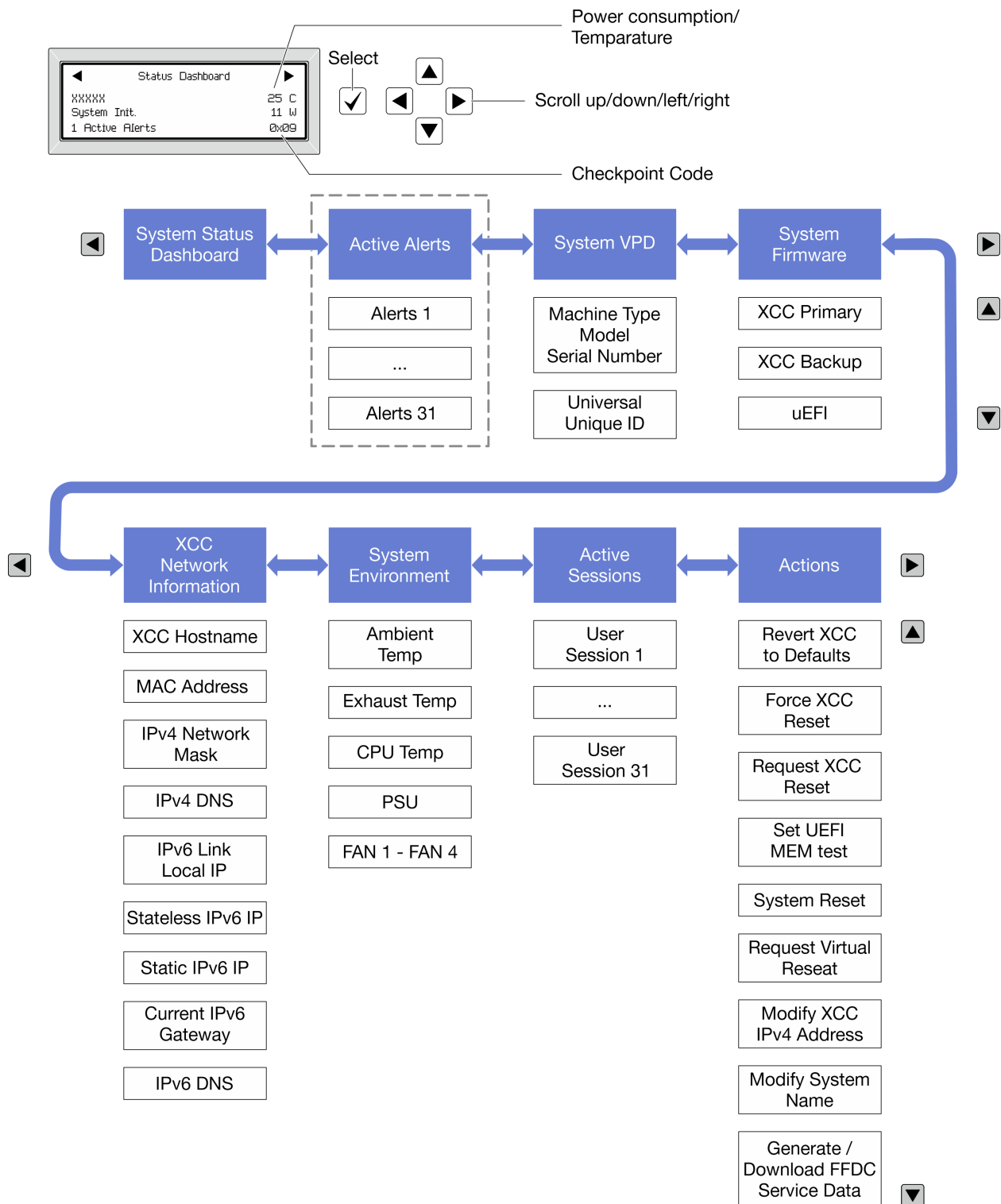
The diagnostics device consists of an LCD display and 5 navigation buttons.



Option flow diagram

The LCD panel displays various system information. Navigate through the options with the scroll keys.

Depending on the model, the options and entries on the LCD display might be different.

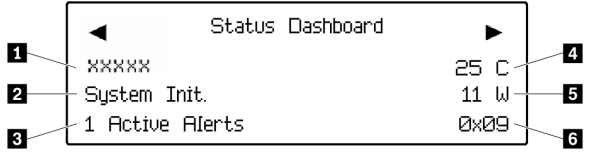


Full menu list

Following is the list of available options. Switch between an option and the subordinate information entries with the select button, and switch among options or information entries with the scroll buttons.

Depending on the model, the options and entries on the LCD display might be different.

Home Menu (System Status Dashboard)

Home Menu	Example
1 System name 2 System status 3 Active alert quantity 4 Temperature 5 Power consumption 6 Checkpoint code	 <p>The screenshot shows a 'Status Dashboard' with the following information: 'xxxxxx' (1), 'System Init.' (2), '1 Active Alerts' (3), '25 C' (4), '11 W' (5), and '0x09' (6).</p>

Active Alerts

Sub Menu	Example
Home screen: Active error quantity Note: The “Active Alerts” menu displays only the quantity of active errors. If no errors occur, the “Active Alerts” menu will not be available during navigation.	1 Active Alerts
Details screen: <ul style="list-style-type: none"> • Error message ID (Type: Error/Warning/Information) • Occurrence time • Possible sources of the error 	Active Alerts: 1 Press ▼ to view alert details FQXSPPU009N(Error) 04/07/2020 02:37:39 PM CPU 1 Status: Configuration Error

System VPD Information

Sub Menu	Example
<ul style="list-style-type: none"> • Machine type and serial number • Universal Unique ID (UUID) 	Machine Type: xxxx Serial Num: xxxxxx Universal Unique ID: xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

System Firmware

Sub Menu	Example
XCC Primary <ul style="list-style-type: none"> Firmware level (status) Build ID Version number Release date 	XCC Primary (Active) Build: DVI399T Version: 4.07 Date: 2020-04-07
XCC Backup <ul style="list-style-type: none"> Firmware level (status) Build ID Version number Release date 	XCC Backup (Active) Build: D8BT05I Version: 1.00 Date: 2019-12-30
UEFI <ul style="list-style-type: none"> Firmware level (status) Build ID Version number Release date 	UEFI (Inactive) Build: D0E101P Version: 1.00 Date: 2019-12-26

XCC Network Information

Sub Menu	Example
<ul style="list-style-type: none"> XCC hostname MAC address IPv4 Network Mask IPv4 DNS IPv6 Link Local IP Stateless IPv6 IP Static IPv6 IP Current IPv6 Gateway IPv6 DNS <p>Note: Only the MAC address that is currently in use is displayed (extension or shared).</p>	XCC Network Information XCC Hostname: XCC-xxxx-SN MAC Address: xx:xx:xx:xx:xx:xx IPv4 IP: xx.xx.xx.xx IPv4 Network Mask: x.x.x.x IPv4 Default Gateway: x.x.x.x

System Environmental Information

Sub Menu	Example
<ul style="list-style-type: none">• Ambient temperature• Exhaust temperature• CPU temperature• PSU status• Spinning speed of fans by RPM	Ambient Temp: 24 C Exhaust Temp: 30 C CPU1 Temp: 50 C PSU1: Vin= 213 w Inlet= 26 C FAN1 Front: 21000 RPM FAN2 Front: 21000 RPM FAN3 Front: 21000 RPM FAN4 Front: 21000 RPM

Active Sessions

Sub Menu	Example
Quantity of active sessions	Active User Sessions: 1

Actions

Sub Menu	Example
Several quick actions are available: <ul style="list-style-type: none">• Revert XCC to Defaults• Force XCC Reset• Request XCC Reset• Set UEFI Memory Test• Request Virtual Reseat• Modify XCC Static IPv4 Address/Net mask/Gateway• Modify System Name• Generate/Download FFDC Service Data	Request XCC Reset? This will request the BMC to reboot itself. Hold ✓ for 3 seconds

System Management Module 2 (SMM 2) LEDS

The following illustration shows the LEDs on the SMM2 module.

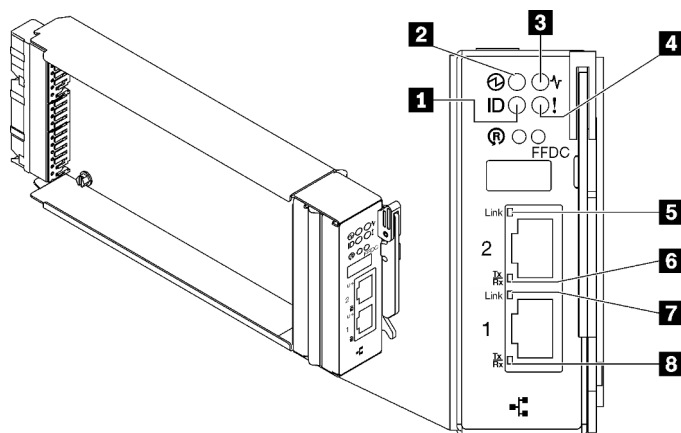


Figure 255. SMM2 LEDs

Table 25. SMM2 connectors and LEDs

1 Identification LED (blue)	5 Ethernet port 2 link (RJ-45) LED (green)
2 Power LED (green)	6 Ethernet port 2 activity (RJ-45) LED (green)
3 Status LED (green)	7 Ethernet port 1 link (RJ-45) LED (green)
4 Check log LED (yellow)	8 Ethernet port 1 activity (RJ-45) LED (green)

1 Identification LED: When this LED is lit (blue), it indicates the enclosure location in a rack.

2 Power-on LED: When this LED is lit (green), it indicates that the SMM2 has power.

3 Status LED: This LED (green) indicates the operating status of the SMM2.

- **Continuously on:** The SMM2 has encountered one or more problems.
- **Off:** When the enclosure power is on, it indicates the SMM2 has encountered one or more problems.
- **Flashing:** The SMM2 is working.
 - During the pre-boot process, the LED flashes rapidly.
 - Ten times per second: The SMM2 hardware is working and the firmware is ready to initialize.
 - Two times per second: The firmware is initializing.
 - When the pre-boot process is completed and the SMM2 is working correctly, the LED flashes at a slower speed (about once every two seconds).

4 Check log LED: When this LED is lit (yellow), it indicates that a system error has occurred. Check the SMM2 event log for additional information.

5 Ethernet port 2 link (RJ-45) LED: When this LED is lit (green), it indicates that there is an active connection through the remote management and console (Ethernet) port 2 to the management network.

6 Ethernet port 2 activity (RJ-45) LED: When this LED is flashing (green), it indicates that there is an activity through the remote management and console (Ethernet) port 2 over the management network.

7 Ethernet port 1 link (RJ-45) LED: When this LED is lit (green), it indicates that there is an active connection through the remote management and console (Ethernet) port 1 to the management network.

8 Ethernet port 1 activity (RJ-45) LED: When this LED is flashing (green), it indicates that there is an activity through the remote management and console (Ethernet) port 1 over the management network.

Power supply LEDs

This topic provides information about various power supply LED status and corresponding action suggestions.

The following minimal configuration is required for the solution to start:

- One DW612S Enclosure
- One SD650 V3 tray (with two compute nodes)
- Two processors per node
- 16 DIMMs per node
- Two CFF v4 power supplies (2400W or above) or one DWC PSU
- One drive (any type) (If OS is needed for debugging)

The power supplies get electrical power from a 200 - 240 V ac power source and convert the ac input into 12 V outputs. The power supplies are capable of autoranging within the input voltage range. There is one common power domain for the enclosure that distributes power to each of the DWC tray and modules through the system midplane.

AC redundancy is achieved by distributing the ac power cord connections between independent ac circuits.

Each power supply has internal fans and a controller. The power supply controller can be powered by any installed power supply that is providing power through the midplane.

Attention: The power supplies contain internal cooling fans. Do not obstruct the fan exhaust vents.

The enclosure does not support mixing of low input voltage power supplies with high input voltage power supplies. For example, if you install a power supply with an input voltage of 100 - 127 V ac in a enclosure that is powered by 200 - 240 V ac power supplies, the 100 - 127 V power supply will not power on. The same restriction applies to a enclosure that is powered by 100 - 127 V ac power supplies. If you install a 200 - 240 V ac power supply in a enclosure that is powered by 100 - 127 V ac power supplies, the 200 - 240 V ac power supply will not power on.

The following illustration shows the LEDs on the power supply:

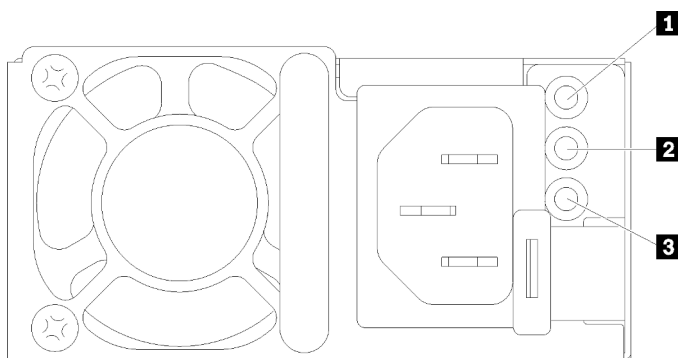


Figure 256. AC power supply LEDs

1 Input (AC) power LED (green)	3 Power supply error LED (yellow)
2 Output (DC) power LED (green)	

There are three LEDs on each power supply:

1 AC power LED (green): When this LED is lit (green), it indicates that ac power is being supplied to the power supply.

2 DC power LED (green): When this LED is lit (green), it indicates that dc power is being supplied from the power supply to the enclosure midplane.

3 Power supply error LED (yellow): When this LED is lit (yellow), it indicates that there is a fault with the power supply. Dump the FFDC log from the system and contact Lenovo back end support team for PSU data log reviewing.

Note: Before unplugging the ac power cord from the power supply, or removing the power supply from the enclosure, verify that the capacity of the remaining power supplies are sufficient to meet the minimum power requirements for all components in the enclosure.

DWC power supply LEDs

This topic provides information about various DWC power supply LED status and corresponding action suggestions.

The following minimal configuration is required for the solution to start:

- One DW612S Enclosure
- One SD650 V3 tray (with two compute nodes)
- Two processors per node
- 16 DIMMs per node
- Two CFF v4 power supplies (2400W or above) or one DWC PSU
- One drive (any type) (If OS is needed for debugging)

The power supplies get electrical power from a 200 - 240 V ac power source and convert the ac input into 12 V outputs. The power supplies are capable of autoranging within the input voltage range. There is one common power domain for the enclosure that distributes power to each of the DWC tray and modules through the system midplane.

AC redundancy is achieved by distributing the ac power cord connections between independent ac circuits.

Each DWC power supply has internal water loops and a controller. The power supply controller can be powered by any installed power supply that is providing power through the midplane.

The enclosure does not support mixing of low input voltage power supplies with high input voltage power supplies. For example, if you install a power supply with an input voltage of 100 - 127 V ac in a enclosure that is powered by 200 - 240 V ac power supplies, the 100 - 127 V power supply will not power on. The same restriction applies to a enclosure that is powered by 100 - 127 V ac power supplies. If you install a 200 - 240 V ac power supply in a enclosure that is powered by 100 - 127 V ac power supplies, the 200 - 240 V ac power supply will not power on.

The following illustration shows the LEDs on the DWC power supply:

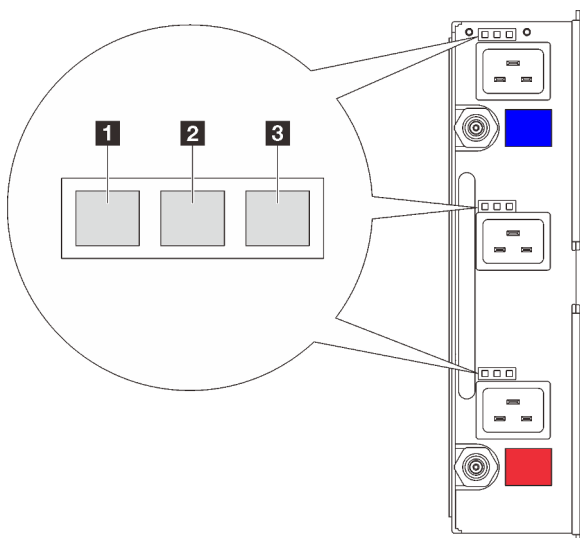


Figure 257. DWC power supply LEDs

1 Input (AC) power LED (green)	3 Power supply error LED (yellow)
2 Output (DC) power LED (green)	

There are nine LEDs on each DWC power supply (three per power supply bay):

1 AC power LED (green): When this LED is lit (green), it indicates that ac power is being supplied to the DWC power supply in the corresponding power supply bay.

2 DC power LED (green): When this LED is lit (green), it indicates that dc power is being supplied from the corresponding power supply bay to the enclosure midplane.

3 Power supply error LED (yellow): When this LED is lit (yellow), it indicates that there is a fault with the corresponding power supply bay. Dump the FFDC log from the system and contact Lenovo back end support team for PSU data log reviewing.

Note: Before unplugging the ac power cord from the DWC power supply, or removing the DWC power supply from the enclosure, verify that the capacity of the remaining power supplies are sufficient to meet the minimum power requirements for all components in the enclosure.

Drip sensor LED

The following illustration shows the light-emitting diodes (LEDs) on the drip sensor.

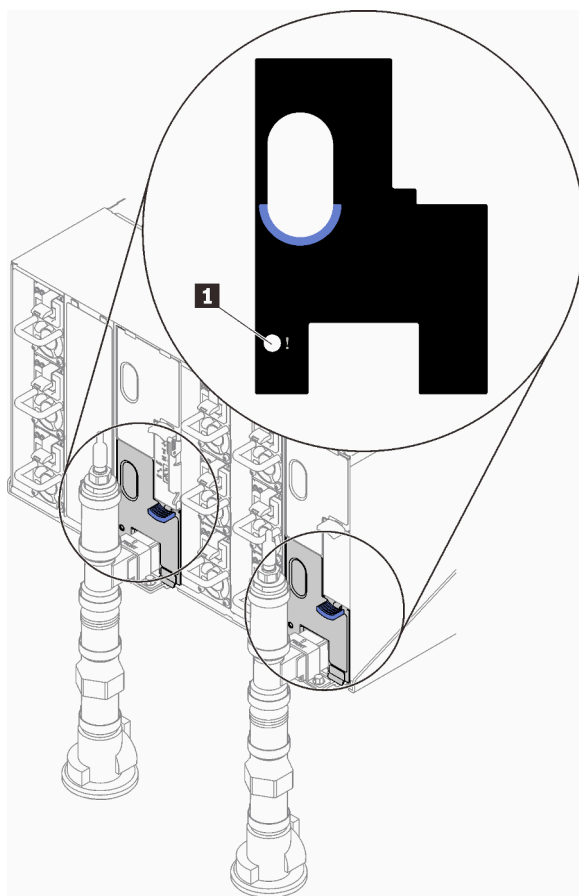


Figure 258. Drip sensor LED

Table 26. Drip sensor LED

1 Drip sensor LED (yellow)

1 Drip sensor LED: When this LED is lit (yellow), it indicates that the drip sensor detects water in its respective catch basin.

System-board LEDs

The following illustrations show the light-emitting diodes (LEDs) on the system board.

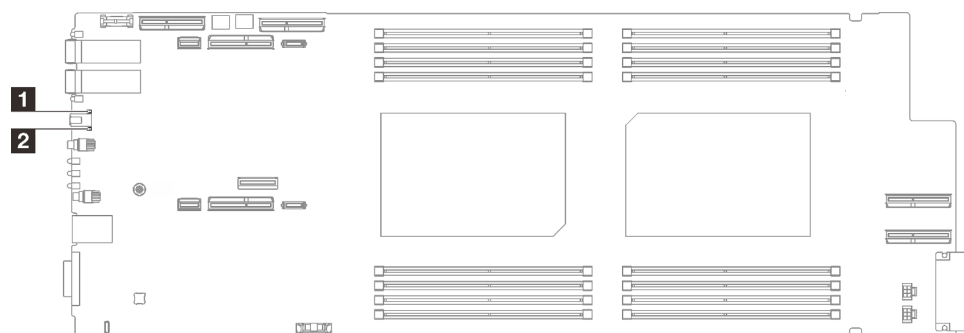


Figure 259. System-board LEDs

Table 27. System-board LEDs

1 XCC heartbeat LED (green)	2 ME heartbeat LED (green)
------------------------------------	-----------------------------------

1 XCC heartbeat LED (green) behavior:

Blinking slowly: XCC is functioning.

Blinking rapidly and constantly: XCC is malfunctioning.

On: XCC is malfunctioning.

Off: XCC is malfunctioning.

2 ME heartbeat LED (green) behavior:

Blinking: PCH ME is functioning.

On: PCH ME is malfunctioning.

Off: PCH ME is malfunctioning.

General problem determination procedures

Use the information in this section to resolve problems if the event log does not contain specific errors or the server is inoperative.

If you are not sure about the cause of a problem and the power supplies are working correctly, complete the following steps to attempt to resolve the problem:

1. Power off the server.
2. Make sure that the server is cabled correctly.
3. Remove or disconnect the following devices if applicable, one at a time, until you find the failure. Power on and configure the server each time you remove or disconnect a device.
 - Any external devices.
 - Surge-suppressor device (on the server).
 - Printer, mouse, and non-Lenovo devices.
 - Each adapter.
 - Hard disk drives.
 - Memory modules until you reach the minimal configuration for debugging that is supported for the server.

To determine the minimal configuration for your server, see “Minimal configuration for debugging” in [“Technical specifications” on page 4](#).

4. Power on the server.

If the problem is solved when you remove an adapter from the server, but the problem recurs when you install the same adapter again, suspect the adapter. If the problem recurs when you replace the adapter with a different one, try a different PCIe slot.

If the problem appears to be a networking problem and the server passes all system tests, suspect a network cabling problem that is external to the server.

Resolving suspected power problems

Power problems can be difficult to solve. For example, a short circuit can exist anywhere on any of the power distribution buses. Usually, a short circuit will cause the power subsystem to shut down because of an overcurrent condition.

Complete the following steps to diagnose and resolve a suspected power problem.

Step 1. Check the event log and resolve any errors related to the power.

Note: Start with the event log of the application that is managing the server. For more information about event logs, see [“Event logs” on page 261](#).

Step 2. Check for short circuits, for example, if a loose screw is causing a short circuit on a circuit board.

Step 3. Remove the adapters and disconnect the cables and power cords to all internal and external devices until the server is at the minimal configuration for debugging that is required for the server to start. To determine the minimal configuration for your server, see “Minimal configuration for debugging” in [“Technical specifications” on page 4](#).

Step 4. Reconnect all AC power cords and turn on the server. If the server starts successfully, reseal the adapters and devices one at a time until the problem is isolated.

If the server does not start from the minimal configuration, replace the components in the minimal configuration one at a time until the problem is isolated.

Resolving suspected Ethernet controller problems

The method that you use to test the Ethernet controller depends on which operating system you are using. See the operating-system documentation for information about Ethernet controllers, and see the Ethernet controller device-driver readme file.

Complete the following steps to attempt to resolve suspected problems with the Ethernet controller.

Step 1. Make sure that the correct device drivers, which come with the server are installed and that they are at the latest level.

Step 2. Make sure that the Ethernet cable is installed correctly.

- The cable must be securely attached at all connections. If the cable is attached but the problem remains, try a different cable.
- If you set the Ethernet controller to operate at 100 Mbps or 1000 Mbps, you must use Category 5 cabling.

Step 3. Determine whether the hub supports auto-negotiation. If it does not, try configuring the integrated Ethernet controller manually to match the speed and duplex mode of the hub.

Step 4. Check the Ethernet controller LEDs on the server. These LEDs indicate whether there is a problem with the connector, cable, or hub.

Ethernet controller LED locations are specified in [“Troubleshooting by system LEDs and diagnostics display” on page 263](#).

- The Ethernet link status LED is lit when the Ethernet controller receives a link pulse from the hub. If the LED is off, there might be a defective connector or cable or a problem with the hub.
- The Ethernet transmit/receive activity LED is lit when the Ethernet controller sends or receives data over the Ethernet network. If the Ethernet transmit/receive activity is off, make sure that the hub and network are operating and that the correct device drivers are installed.

Step 5. Check the Network activity LED on the server. The Network activity LED is lit when data is active on the Ethernet network. If the Network activity LED is off, make sure that the hub and network are operating and that the correct device drivers are installed.

Network activity LED location is specified in [“Troubleshooting by system LEDs and diagnostics display” on page 263](#).

Step 6. Check for operating-system-specific causes of the problem, and also make sure that the operating system drivers are installed correctly.

Step 7. Make sure that the device drivers on the client and server are using the same protocol.

If the Ethernet controller still cannot connect to the network but the hardware appears to be working, the network administrator must investigate other possible causes of the error.

Troubleshooting by symptom

Use this information to find solutions to problems that have identifiable symptoms.

To use the symptom-based troubleshooting information in this section, complete the following steps:

1. Check the event log of the application that is managing the server and follow the suggested actions to resolve any event codes.
 - If you are managing the server from the Lenovo XClarity Administrator, begin with the Lenovo XClarity Administrator event log.
 - If you are using some other management application, begin with the Lenovo XClarity Controller event log.

For more information about event logs (see [“Event logs” on page 261](#)).

2. Review this section to find the symptoms that you are experiencing and follow the suggested actions to resolve the issue.
3. If the problem persists, contact support (see [“Contacting Support” on page 299](#)).

Intermittent problems

Use this information to solve intermittent problems.

- [“Intermittent external device problems” on page 278](#)
- [“Intermittent KVM problems” on page 278](#)
- [“Intermittent unexpected reboots” on page 279](#)

Intermittent external device problems

Complete the following steps until the problem is solved.

1. Update the UEFI and XCC firmware to the latest versions.
2. Make sure that the correct device drivers are installed. See the manufacturer's website for documentation.
3. For a USB device:
 - a. Make sure that the device is configured correctly.

Restart the server and press the key according to the on-screen instructions to display the LXPM system setup interface. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.) Then, click **System Settings** → **Devices and I/O Ports** → **USB Configuration**.

- b. Connect the device to another port. If using a USB hub, remove the hub and connect the device directly to the compute node. Make sure that the device is configured correctly for the port.

Intermittent KVM problems

Complete the following steps until the problem is solved.

Video problems:

1. Make sure that all cables and the console breakout cable are properly connected and secure.

2. Make sure that the monitor is working properly by testing it on another compute node.
3. Test the console breakout cable on a working compute node to ensure that it is operating properly. Replace the console breakout cable if it is defective.

Keyboard problems:

Make sure that all cables and the console breakout cable are properly connected and secure.

Mouse problems:

Make sure that all cables and the console breakout cable are properly connected and secure.

Intermittent unexpected reboots

Note: Some uncorrectable errors require that the server reboot so that it can disable a device, such as a memory DIMM or a processor to allow the machine to boot up properly.

1. If the reset occurs during POST and the POST watchdog timer is enabled, make sure that sufficient time is allowed in the watchdog timeout value (POST Watchdog Timer).

To check the POST watchdog time, restart the server and press the key according to the on-screen instructions to display the LXPM system setup interface. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.) Then, click **BMC Settings → POST Watchdog Timer**.

2. If the reset occurs after the operating system starts, enter the operating system when the system operates normally and set up operating system kernel dump process (Windows and Linux base operating systems will be using different method). Enter the UEFI setup menus and disable the feature, or disable it with the following OneCli command.
`OneCli.exe config set SystemRecovery.RebootSystemOnNMI Disable --bmcxcc_userid PASSWORD@xcc_ipaddress`
3. See the management controller event log to check for an event code that indicates a reboot. See “Event logs” on page 261 for information about viewing the event log. If you are using Linux base operating system, then capture all logs back to Lenovo support for further investigation.

Keyboard, mouse, KVM switch or USB-device problems

Use this information to solve problems related to a keyboard, mouse, KVM switch or USB-device problems.

- “All or some keys on the keyboard do not work” on page 279
- “Mouse does not work” on page 280
- “KVM switch problems” on page 280
- “USB-device does not work” on page 280

All or some keys on the keyboard do not work

1. Make sure that:
 - The keyboard cable is securely connected.
 - The server and the monitor are turned on.
2. If you are using a USB keyboard, run the Setup utility and enable keyboardless operation.
3. If you are using a USB keyboard and it is connected to a USB hub, disconnect the keyboard from the hub and connect it directly to the server.
4. Try to install the USB keyboard into a different USB port as available.
5. Replace the keyboard.

Mouse does not work

1. Make sure that:
 - The mouse cable is securely connected to the server.
 - The mouse device drivers are installed correctly.
 - The server and the monitor are turned on.
 - The mouse option is enabled in the Setup utility.
2. If you are using a USB mouse and it is connected to a USB hub, disconnect the mouse from the hub and connect it directly to the server.
3. Try to install the USB mouse into a different USB port as available.
4. Replace the mouse.

KVM switch problems

1. Make sure that the KVM switch is supported by your server.
2. Make sure that the KVM switch is powered on correctly.
3. If the keyboard, mouse or monitor can be operated normally with direct connection to the server, then replace the KVM switch.

USB-device does not work

1. Make sure that:
 - The correct USB device driver is installed.
 - The operating system supports USB devices.
2. Make sure that the USB configuration options are set correctly in system setup.

Restart the server and press the key according to the on-screen instructions to display the LXPM system setup interface. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.) Then, click **System Settings → Devices and I/O Ports → USB Configuration**.

3. If you are using a USB hub, disconnect the USB device from the hub and connect it directly to the server.

Memory problems

See this section to resolve issues related to memory.

Common memory problems

- “Multiple memory modules in a channel identified as failing” on page 280
- “Displayed system memory is less than installed physical memory” on page 281
- “Invalid memory population detected” on page 282

Multiple memory modules in a channel identified as failing

Note: Each time you install or remove a memory module, you must disconnect the server from the power source; then, wait 10 seconds before restarting the server.

Complete the following procedure to solve the problem.

1. Reseat the memory modules; then, restart the server.
2. Remove the highest-numbered memory module of those that are identified and replace it with an identical known good memory module; then, restart the server. Repeat as necessary. If the failures continue after all identified memory modules are replaced, go to step 4.

3. Return the removed memory modules, one at a time, to their original connectors, restarting the server after each memory module, until a memory module fails. Replace each failing memory module with an identical known good memory module, restarting the server after each memory module replacement. Repeat step 3 until you have tested all removed memory modules.
4. Replace the highest-numbered memory module of those identified; then, restart the server. Repeat as necessary.
5. Reverse the memory modules between the channels (of the same processor), and then restart the server. If the problem is related to a memory module, replace the failing memory module.
6. (Trained technician only) Install the failing memory module into a memory module connector for processor 2 (if installed) to verify that the problem is not the processor or the memory module connector.
7. (Trained technician only) Replace the system board.

Displayed system memory is less than installed physical memory

Complete the following procedure to solve the problem.

Note: Each time you install or remove a memory module, you must disconnect the server from the power source; then, wait 10 seconds before restarting the server.

1. Make sure that:
 - No error LEDs are lit. See [“Troubleshooting by system LEDs and diagnostics display” on page 263](#).
 - No memory module error LEDs are lit on the system board.
 - Memory mirrored channel does not account for the discrepancy.
 - The memory modules are seated correctly.
 - You have installed the correct type of memory module (see [“Memory module installation rules and order” on page 34](#) for requirements).
 - After changing or replacing a memory module, memory configuration is updated accordingly in the Setup Utility.
 - All banks of memory are enabled. The server might have automatically disabled a memory bank when it detected a problem, or a memory bank might have been manually disabled.
 - There is no memory mismatch when the server is at the minimum memory configuration.
2. Reseat the memory modules, and then restart the server.
3. Check the POST error log:
 - If a memory module was disabled by a systems-management interrupt (SMI), replace the memory module.
 - If a memory module was disabled by the user or by POST, reseat the memory module; then, run the Setup Utility and enable the memory module.
4. Run memory diagnostics. When you start a solution and press the key according to the on-screen instructions, the LXPM interface is displayed by default. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.) You can perform memory diagnostics with this interface. From the Diagnostic page, go to **Run Diagnostic → Memory test → Advanced Memory Test**.
5. Reverse the modules between the channels (of the same processor), and then restart the server. If the problem is related to a memory module, replace the failing memory module.
6. Re-enable all memory modules using the Setup Utility, and then restart the server.
7. (Trained technician only) Install the failing memory module into a memory module connector for processor 2 (if installed) to verify that the problem is not the processor or the memory module connector.
8. (Trained technician only) Replace the system board.

Invalid memory population detected

If this warning message appears, complete the following steps:

Invalid memory population (unsupported DIMM population) detected. Please verify memory configuration is valid.

1. See [“Memory module installation rules and order” on page 34](#) to make sure the present memory module population sequence is supported.
2. If the present sequence is indeed supported, see if any of the modules is displayed as “disabled” in Setup Utility.
3. Reseat the module that is displayed as “disabled,” and reboot the system.
4. If the problem persists, replace the memory module.

Monitor and video problems

Use this information to solve problems related to a monitor or video.

- [“Screen is blank” on page 282](#)
- [“Screen goes blank when you start some application programs” on page 282](#)
- [“The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted” on page 283](#)

Screen is blank

Note: Make sure that the expected boot mode has not been changed from the UEFI to Legacy or vice versa.

1. If the server is attached to a KVM switch, bypass the KVM switch to eliminate it as a possible cause of the problem: connect the monitor cable directly to the correct connector on the rear of the server.
2. The management controller remote presence function is disabled if you install an optional video adapter. To use the management controller remote presence function, remove the optional video adapter.
3. If the server is installed with the graphical adapters while turning on the server, the Lenovo logo is displayed on the screen after approximately 3 minutes. This is normal operation while the system loads.
4. Make sure that:
 - The server is turned on and there is power supplied to the server.
 - The monitor cables are connected correctly.
 - The monitor is turned on and the brightness and contrast controls are adjusted correctly.
5. Make sure that the correct server is controlling the monitor, if applicable.
6. Make sure that corrupted server firmware is not affecting the video; see [“Update the firmware” on page 239](#).
7. Observe the LEDs on the system board; if the codes are changing, go to step 6.
8. Replace the following components one at a time, in the order shown, restarting the server each time:
 - a. Monitor
 - b. Video adapter (if one is installed)
 - c. (Trained technician only) System board.

Screen goes blank when you start some application programs

1. Make sure that:
 - The application program is not setting a display mode that is higher than the capability of the monitor.
 - You installed the necessary device drivers for the application.

The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted

1. If the monitor self-tests show that the monitor is working correctly, consider the location of the monitor. Magnetic fields around other devices (such as transformers, appliances, fluorescents, and other monitors) can cause screen jitter or wavy, unreadable, rolling, or distorted screen images. If this happens, turn off the monitor.

Attention: Moving a color monitor while it is turned on might cause screen discoloration.

Move the device and the monitor at least 305 mm (12 in.) apart, and turn on the monitor.

Notes:

- a. To prevent diskette drive read/write errors, make sure that the distance between the monitor and any external diskette drive is at least 76 mm (3 in.).
 - b. Non-Lenovo monitor cables might cause unpredictable problems.
2. Reseat the monitor cable.
 3. Replace the components listed in step 2 one at a time, in the order shown, restarting the server each time:
 - a. Monitor cable
 - b. Video adapter (if one is installed)
 - c. Monitor
 - d. (Trained technician only) System board.

Network problems

Use this information to resolve issues related to networking.

- [“Cannot wake server using Wake on LAN” on page 283](#)
- [“Could not log in using LDAP account with SSL enabled” on page 283](#)

Cannot wake server using Wake on LAN

Complete the following steps until the problem is resolved:

1. If you are using the dual-port network adapter and the server is connected to the network using Ethernet 5 connector, check the system-error log or IMM2 system event log (see [“Event logs” on page 261](#)), make sure:
 - a. Fan 3 is running in standby mode, if Emulex dual port 10GBase-T embedded adapter is installed.
 - b. The room temperature is not too high. See [“Specifications” on page 3](#)
 - c. The air vents are not blocked.
 - d. The air baffle is installed securely.
2. Reseat the dual-port network adapter.
3. Turn off the server and disconnect it from the power source; then, wait 10 seconds before restarting the server.
4. If the problem still remains, replace the dual-port network adapter.

Could not log in using LDAP account with SSL enabled

Complete the following steps until the problem is resolved:

1. Make sure that the license key is valid.
2. Generate a new license key and log in again.

Observable problems

Use this information to solve observable problems.

- “Server hangs during the UEFI boot process” on page 284
- “The server immediately displays the POST Event Viewer when it is turned on” on page 284
- “Server is unresponsive (POST is complete and operating system is running)” on page 284
- “Server is unresponsive (POST failed and cannot start System Setup)” on page 285
- “Voltage planar fault is displayed in the event log” on page 285
- “Unusual smell” on page 285
- “Server seems to be running hot” on page 286
- “Cannot enter legacy mode after installing a new adapter” on page 286
- “Cracked parts or cracked chassis” on page 286

Server hangs during the UEFI boot process

If the system hangs during the UEFI boot process with the message UEFI: DXE INIT on the display, make sure that Option ROMs were not configured with a setting of **Legacy**. You can remotely view the current settings for Option ROMs by running the following command using the Lenovo XClarity Essentials OneCLI:

```
onecli config show EnableDisableAdapterOptionROMSupport --bmc xcc_userid:xcc_password@xcc_ipaddress
```

To recover a system that hangs during the boot process with Legacy Option ROM settings, see the following Tech Tip:

<https://datacentersupport.lenovo.com/solutions/ht506118>

If legacy Option ROMs must be used, do not set slot Option ROMs to **Legacy** on the Devices and I/O Ports menu. Instead, set slot Option ROMs to **Auto** (the default setting), and set the System Boot Mode to **Legacy Mode**. Legacy option ROMs will be invoked shortly before the system boots.

The server immediately displays the POST Event Viewer when it is turned on

Complete the following steps until the problem is solved.

1. Correct any errors that are indicated by the system LEDs and diagnostics display.
2. Make sure that the server supports all the processors and that the processors match in speed and cache size.

You can view processor details from system setup.

To determine if the processor is supported for the server, see <https://serverproven.lenovo.com>.

3. (Trained technician only) Make sure that processor 1 is seated correctly
4. (Trained technician only) Remove processor 2 and restart the server.
5. Replace the following components one at a time, in the order shown, restarting the server each time:
 - a. (Trained technician only) Processor
 - b. (Trained technician only) System board

Server is unresponsive (POST is complete and operating system is running)

Complete the following steps until the problem is solved.

- If you are in the same location as the compute node, complete the following steps:

1. If you are using a KVM connection, make sure that the connection is operating correctly. Otherwise, make sure that the keyboard and mouse are operating correctly.
 2. If possible, log in to the compute node and verify that all applications are running (no applications are hung).
 3. Restart the compute node.
 4. If the problem remains, make sure that any new software has been installed and configured correctly.
 5. Contact your place of purchase of the software or your software provider.
- If you are accessing the compute node from a remote location, complete the following steps:
 1. Make sure that all applications are running (no applications are hung).
 2. Attempt to log out of the system and log back in.
 3. Validate the network access by pinging or running a trace route to the compute node from a command line.
 - a. If you are unable to get a response during a ping test, attempt to ping another compute node in the enclosure to determine whether it is a connection problem or compute node problem.
 - b. Run a trace route to determine where the connection breaks down. Attempt to resolve a connection issue with either the VPN or the point at which the connection breaks down.
 4. Restart the compute node remotely through the management interface.
 5. If the problem remains, verify that any new software has been installed and configured correctly.
 6. Contact your place of purchase of the software or your software provider.

Server is unresponsive (POST failed and cannot start System Setup)

Configuration changes, such as added devices or adapter firmware updates, and firmware or application code problems can cause the server to fail POST (the power-on self-test).

If this occurs, the server responds in either of the following ways:

- The server restarts automatically and attempts POST again.
- The server hangs, and you must manually restart the server for the server to attempt POST again.

After a specified number of consecutive attempts (automatic or manual), the server reverts to the default UEFI configuration and starts System Setup so that you can make the necessary corrections to the configuration and restart the server. If the server is unable to successfully complete POST with the default configuration, there might be a problem with the system board. You can specify the number of consecutive restart attempts in System Setup. Click **System Settings** → **Recovery** → **POST Attempts** → **POST Attempts Limit**. Available options are 3, 6, 9, and 255.

Voltage planar fault is displayed in the event log

Complete the following steps until the problem is solved.

1. Revert the system to the minimum configuration. For the minimally required number of processors and DIMMs, see [“Specifications” on page 3](#)
2. Restart the system.
 - If the system restarts, add each of the removed items one at a time and restart the system each time until the error occurs. Replace the item for which the error occurs.
 - If the system does not restart, suspect the system board.

Unusual smell

Complete the following steps until the problem is solved.

1. An unusual smell might be coming from newly installed equipment.
2. If the problem remains, contact Lenovo Support.

Server seems to be running hot

Complete the following steps until the problem is solved.

Multiple compute nodes or chassis:

1. Make sure that the room temperature is within the specified range. See [“Specifications” on page 3](#)
2. Make sure that the fans are installed correctly.
3. Update the UEFI and XCC firmware to the latest versions.
4. Make sure that the fillers in the server are installed correctly. For detailed installation procedures, see:
 - The “Hardware replacement procedures” section in the *User Guide* of the DW612S enclosure.
 - [Chapter 5 “Hardware replacement procedures” on page 31](#)
5. Use the IPMI command to ramp up the fan speed to the full fan speed to see whether the issue can be resolved.

Note: The IPMI raw command should only be used by trained technician and the each system has its own specific PMI raw command.

6. Check the management processor event log for rising temperature events. If there are no events, the compute node is running within normal operating temperatures. Note that you can expect some variation in temperature.

Cannot enter legacy mode after installing a new adapter

Complete the following procedure to solve the problem.

1. Go to **UEFI Setup → Devices and I/O Ports → Set Option ROM Execution Order**.
2. Move the RAID adapter with operation system installed to the top of the list.
3. Select **Save**.
4. Reboot the system and auto boot to operation system.

Cracked parts or cracked chassis

Contact Lenovo Support.

Optional-device problems

Use this information to solve problems related to optional devices.

- [“Insufficient PCIe resources are detected” on page 286](#)
- [“A Lenovo optional device that was just installed does not work” on page 287](#)
- [“A Lenovo optional device that worked previously does not work now” on page 287](#)

Insufficient PCIe resources are detected

If you see an error message stating “Insufficient PCI Resources Detected,” complete the following steps until the problem is resolved:

1. Press Enter to access System Setup Utility.
2. Select **System Settings → Devices and I/O Ports → MM Config Base**; then, modify the setting to increase the device resources. For example, modify 3 GB to 2 GB or modify 2 GB to 1 GB.
3. Save the settings and restart the system.

4. If the error recurs with the highest device resource setting (1GB), shutdown the system and remove some PCIe devices; then, power on the system.
5. If the reboot failed, repeat step 1 to step 4.
6. If the error recurs, press Enter to access System Setup Utility.
7. Select **System Settings → Devices and I/O Ports → PCI 64-Bit Resource Allocation**, then; modify the setting from **Auto** to **Enable**.
8. If the Boot Device does not support MMIO above 4GB for Legacy Boot, use UEFI Boot Mode or remove/disable some PCIe devices.
9. Contact Lenovo technical support.

A Lenovo optional device that was just installed does not work

1. Make sure that:
 - The device is supported for the server (see <https://serverproven.lenovo.com>).
 - You followed the installation instructions that came with the device and the device is installed correctly.
 - You have not loosened any other installed devices or cables.
 - You updated the configuration information in the Setup utility. Whenever memory or any other device is changed, you must update the configuration.
2. Reseat the device that you have just installed.
3. Replace the device that you have just installed.

A Lenovo optional device that worked previously does not work now

1. Make sure that all of the cable connections for the device are secure.
2. If the device comes with test instructions, use those instructions to test the device.
3. If the failing device is a SCSI device, make sure that:
 - The cables for all external SCSI devices are connected correctly.
 - Any external SCSI device is turned on. You must turn on an external SCSI device before you turn on the server.
4. Reseat the failing device.
5. Replace the failing device.

Power on and power off problems

Use this information to resolve issues when powering on or powering off the server.

- “Server does not power on” on page 287
- “Server does not power off” on page 288

Server does not power on

Complete the following steps until the problem is resolved:

Note: The power button will not function until approximately five to ten seconds after the server has been connected to power to allow the BMC to complete initialization.

1. Make sure that the power button is working correctly:
 - a. Disconnect the server power cords.
 - b. Reconnect the power cords.
 - c. (Trained technician only) Reseat the front operator panel cable, and then repeat steps 1a and 1b.

- (Trained technician only) If the server starts, reseal the front operator panel. If the problem remains, replace the front operator panel.
 - If the server does not start, bypass the power button by using the force power-on jumper. If the server starts, reseal the front operator panel. If the problem remains, replace the front operator panel.
2. Make sure that the reset button is working correctly:
 - a. Disconnect the server power cords.
 - b. Reconnect the power cords.
 - c. (Trained technician only) Reseat the front operator panel cable, and then repeat steps 2a and 2b.
 - (Trained technician only) If the server starts, replace the front operator panel.
 - If the server does not start, go to step 3.
 3. Make sure that both power supplies installed in the server are of the same type. Mixing different power supplies in the server will cause a system error (the system-error LED on the front operator panel turns on).
 4. Make sure that:
 - The power cords are correctly connected to the server and to a working electrical outlet.
 - The type of memory that is installed is correct and the installation rules are met.
 - The DIMMs are fully seated with lock latches fully closed.
 - The LEDs on the power supply do not indicate a problem.
 - The processors are installed in the correct sequence.
 5. Reseat the following components:
 - a. Front operator panel connector
 - b. Power supplies
 6. Replace the following components and restart the server each time:
 - a. Front operator panel connector
 - b. Power supplies
 7. If you just installed an optional device, remove it, and restart the server. If the server now starts, you might have installed more devices than the power supply supports.
 8. Implement the minimum configuration (one processor and one DIMM) to check whether any specific components lock the power permission.
 9. Collect the failure information by capturing the system logs and provide it to Lenovo support.
 10. See [“Power supply LEDs” on page 272](#) and [“DWC power supply LEDs” on page 273](#).

Server does not power off

Complete the following steps until the problem is resolved:

1. Determine whether you are using an Advanced Configuration and Power Interface (ACPI) or a non-ACPI operating system. If you are using a non-ACPI operating system, complete the following steps:
 - a. Press Ctrl+Alt+Delete.
 - b. Turn off the server by pressing the power button and holding it down for 5 seconds.
 - c. Restart the server.
 - d. If the server fails POST and the power button does not work, disconnect the power cord for 20 seconds; then, reconnect the power cord and restart the server.
2. If the problem remains or if you are using an ACPI-aware operating system, suspect the system board (system board assembly).

Power problems

Use this information to resolve issues related to power.

System error LED is on and event log "Power supply has lost input" is displayed

To resolve the problem, ensure that:

1. The power supply is properly connected to a power cord.
2. The power cord is connected to a properly grounded electrical outlet for the server.
3. Make sure that the power supply AC source is stable within the supported range.
4. Swap the power supply to see if the issue follows the power supply, if it follows the power supply, then replace the failing one.
5. Review the event log and see how the problem it is to follow the event log actions to resolved the problems.

Serial-device problems

Use this information to solve problems related to serial devices.

- ["Number of serial ports identified by the operating system is less than the number of installed ports" on page 289](#)
- ["Serial device does not work" on page 289](#)

Number of serial ports identified by the operating system is less than the number of installed ports

1. Make sure that:
 - Each port is assigned a unique address in the Setup utility and none of the serial ports is disabled.
 - The serial-port adapter (if one is present) is seated correctly.
2. Reseat the serial port adapter.
3. Replace the serial port adapter.

Serial device does not work

1. Make sure that:
 - The device is compatible with the server.
 - The serial port is enabled and is assigned a unique address.
 - The device is connected to the correct connector (see [Chapter 2 "Server components" on page 15](#)).
2. Reseat the following components:
 - a. Failing serial device
 - b. Serial cable
3. Replace the following components one at a time, restarting the server each time:
 - a. Failing serial device
 - b. Serial cable
4. (Trained technician only) Replace the system board.

Software problems

Use this information to solve software problems.

1. To determine whether the problem is caused by the software, make sure that:
 - The server has the minimum memory that is needed to use the software. For memory requirements, see the information that comes with the software.

Note: If you have just installed an adapter or memory, the server might have a memory-address conflict.

- The software is designed to operate on the server.
 - Other software works on the server.
 - The software works on another server.
2. If you receive any error messages while you use the software, see the information that comes with the software for a description of the messages and suggested solutions to the problem.
 3. Contact your place of purchase of the software.

Storage drive problems

Use this information to resolve issues related to the hard disk drives.

- [“Server cannot recognize a hard drive” on page 290](#)

Server cannot recognize a hard drive

Complete the following steps until the problem is solved.

1. Verify that the drive is supported for the server. See <https://serverproven.lenovo.com> for a list of supported hard drives.
2. Make sure that the drive is seated in the drive bay properly and that there is no physical damage to the drive connectors.
3. Run the diagnostics tests for the SAS/SATA adapter and hard disk drives. When you start a server and press the key according to the on-screen instructions, the LXPM interface is displayed by default. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.) You can perform hard drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic → Disk Drive Test**.

Based on those tests:

- If the adapter passes the test but the drives are not recognized, replace the backplane signal cable and run the tests again.
- Replace the backplane.
- If the adapter fails the test, disconnect the backplane signal cable from the adapter and run the tests again.
- If the adapter fails the test, replace the adapter.

System Management Module 2 problems

Use this information to resolve issues related the to the System Management Module.

- [“System Management Module 2 does not power on” on page 290](#)
- [“System Management Module 2 status LED is not flashing normally” on page 291](#)
- [“System Management Module 2 ping failure” on page 291](#)

System Management Module 2 does not power on

Complete the following steps until the problem is resolved:

1. Check if the power supplies are installed correctly and power supply LEDs are lit normally.
2. Reseat the SMM2 and check the LED status again.
3. If the problem persists, replace the SMM2.

System Management Module 2 status LED is not flashing normally

When the SMM2 is working, its status LED flashes at a slower speed (about once every two seconds).

If the SMM2 status LED is continuously on or off, or it has been flashing rapidly (two or 10 times per second) for more than 15 minutes, it indicates that the SMM2 may have encountered a problem.

Complete the following steps until the problem is resolved:

1. Reseat the SMM2.
2. If the problem persists, replace the SMM2.

System Management Module 2 ping failure

Complete the following steps until the problem is solved.

1. Check the SMM2 IP address and network status via Lenovo XClarity Controller.
2. Alternatively, you can check SMM2 LEDs to diagnose the SMM2 status (see [“System Management Module 2 \(SMM 2\) LEDs” on page 270](#) for SMM2 LEDs details).
 - If the SMM2 power LED and the status LED are working abnormally, reseat the SMM2.
3. If the problem persists, replace the SMM2.

Water leak problems

Use this information to resolve issues related to water leaks.

The SD650 V3 design is robust, and is unlikely to leak. If the water is observed outside of the enclosure, make sure the both enclosure and rack power supplies have been disconnected. If no water is observed outside of the enclosure, but there is a suspicion of a water leak in the enclosure or in one of the six compute trays, complete the following steps to determine the source of the leak. The enclosure is equipped with a pair of drip sensor assemblies to help detect any water leaks.

Note: A small leak may not reach either of the drip sensors to trigger a warning. Visual confirmation of a small leak may be required.

Suspicious leakage symptoms

The following situations might occur due to leakage problems:

- **Processor over temperature error indicated by the System Error "!" LED being solid ON at the front of the node**
- **One or more of the nodes shut down unexpectedly**
- **Enclosure SMM2 management may report the following events:**
 - [18040179](#) : DripSensor 1 Out: Chassis, Predictive Failure asserted was asserted.
 - [1804017A](#) : DripSensor 2 Out: Chassis, Predictive Failure asserted was asserted.
 - [18080076](#) : DripSensor 1: Chassis, Device Removed / Device Absent was asserted.
 - [18080077](#) : DripSensor 2: Chassis, Device Removed / Device Absent was asserted.

Possible causes of a leak:

- **Leak at quick connects during installation or removal procedures**
- **Leak in the water loop tubing**

Complete the following steps in order until you are able to isolate the cause of the potential leak:

1. Check enclosure SMM2 messages to see if any leakage warnings have been reported. See https://pubs.lenovo.com/dw612s_neptune_enclosure/messages_introduction for more information.
2. Walk to the rear of the rack and visually check the status of each enclosure's left and right side drip sensor LEDs.

Users usually have multiple enclosures per rack. Each enclosure has two drip sensors.

Note: Each enclosure has two drip sensors that should turn on a yellow LED visible through a hole located in the lower left leg of the lower EMC shield if the sensor detects moisture in its drip sensor catch basin.

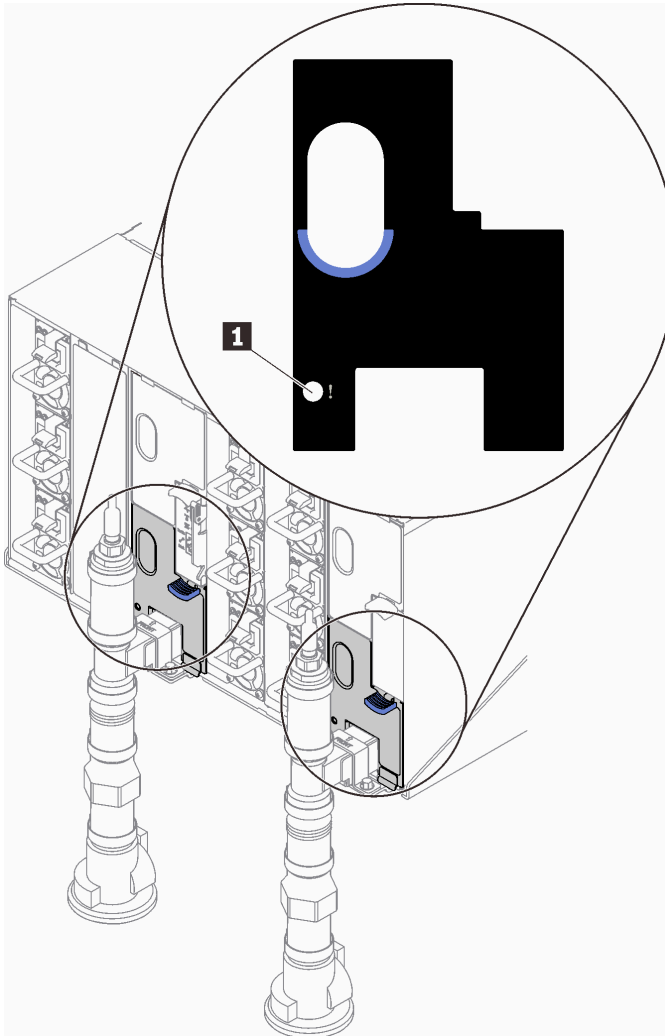
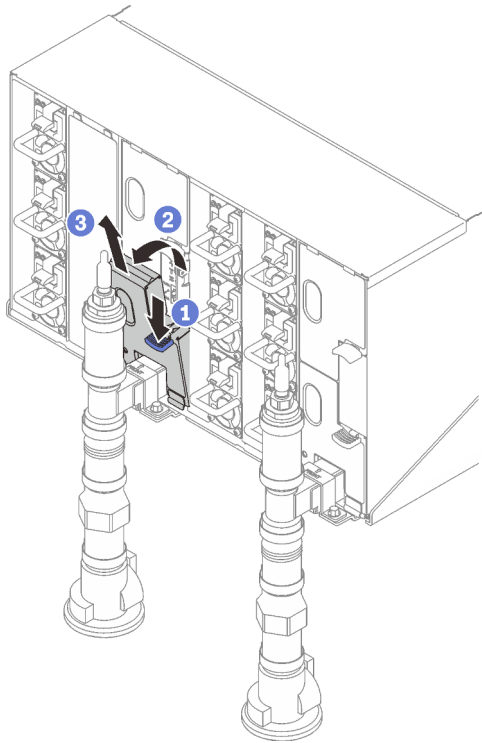


Figure 260. Drip sensor LED

Table 28. Drip sensor LED

<p>1 Drip sensor LED (yellow)</p>
--

3. Visually check the drip sensor catch basin for any moisture.
 - a. Remove the lower and upper EMC shields in the front of the left drip sensor.



Note: If there is a manifold vertical pipe in front of the EMC shield, you need to slide it sideways out from underneath the pipe.

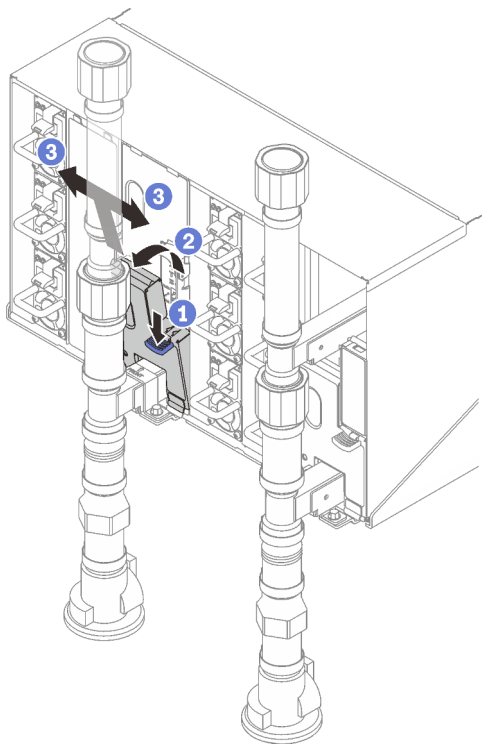


Figure 261. Lower EMC shield removal

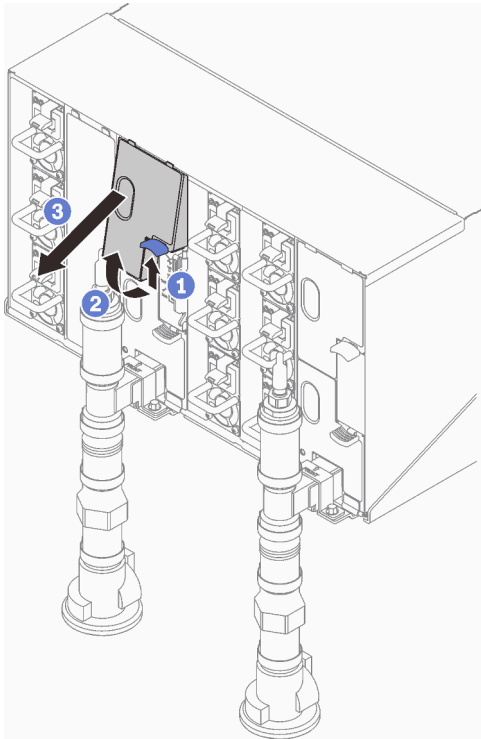


Figure 262. Upper EMC shield removal

- b. Use a flashlight to visually inspect the plastic catch basin for any moisture.
- c. Re-install the upper and lower EMC shields.

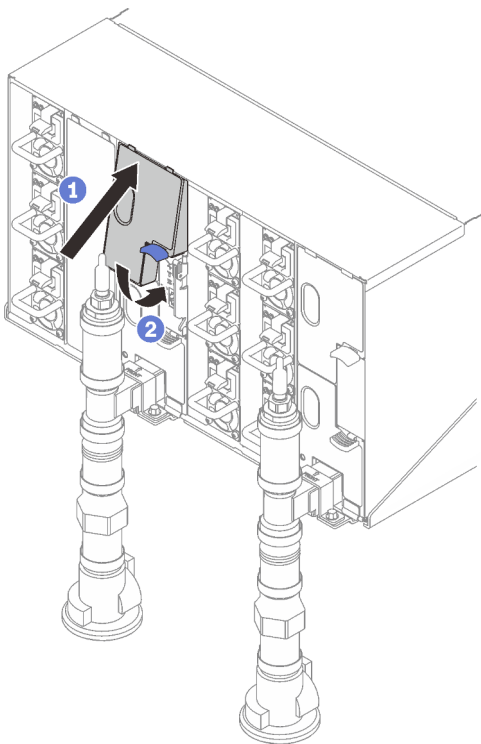


Figure 263. Upper EMC shield installation

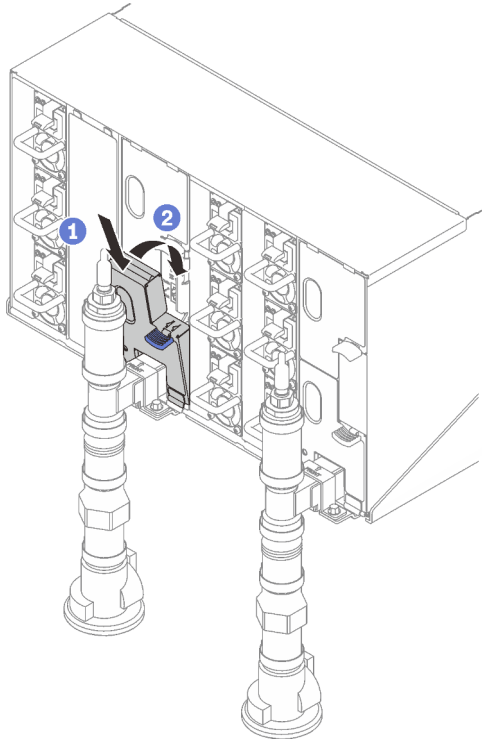


Figure 264. Lower EMC shield installation

- d. Repeat steps for the right side drip sensor catch basin.
4. Power down all nodes either through the OS or by pressing and holding the power button for five seconds.

Note: Green Power LED for each node (two per compute nodes) should be blinking to indicate the nodes are in standby state.

5. Disconnect power cords from all six enclosure power supplies.

Important: Fully disconnect the power to the entire enclosure prior to attempting to identify a leak within an enclosure.

6. Check the water loop for any moisture.
 - a. Remove the top node (bays 11&12) from the enclosure (see [“Remove a DWC tray from the enclosure” on page 45](#)), place it on a stable work surface, remove the cover (see [“Remove the tray cover” on page 48](#)), and carefully inspect the entire water loop (both rubber and copper tubing) for any signs of moisture. Re-install the tray into enclosure (see [“Install a DWC tray in the enclosure” on page 46](#)).
 - b. Repeat steps for the tray in bays 9 and 10.
 - c. Repeat steps for the tray in bays 7 and 8.
 - d. Repeat steps for the tray in bays 5 and 6.
 - e. Repeat steps for the tray in bays 3 and 4.
 - f. Repeat steps for the tray in bays 1 and 2.

Note: It is important to visually inspect the bottom of the enclosure with a flashlight prior to re-installing the bottom most tray (bays 1 and 2) into the enclosure.

7. If you are unable to identify the problem in the steps above, then you may need to replace one or more of the tray water loops (see [“Water loop replacement \(trained technician only\)” on page 53](#)). Contact Product Engineer for the further assistance.

Important: The procedures above only cover the Lenovo DWC solution (from the Eaton Ball valves up through the manifold and into the enclosures and compute trays). If your datacenter Cooling Distribution Unit experiences repeated or frequent low water alerts then you should inspect the data center plumbing between the cooling distribution unit and the Lenovo DWC solution (rack).

Appendix A. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about Lenovo products, you will find a wide variety of sources available from Lenovo to assist you.

On the World Wide Web, up-to-date information about Lenovo systems, optional devices, services, and support are available at:

<http://datacentersupport.lenovo.com>

Note: IBM is Lenovo's preferred service provider for ThinkSystem.

Before you call

Before you call, there are several steps that you can take to try and solve the problem yourself. If you decide that you do need to call for assistance, gather the information that will be needed by the service technician to more quickly resolve your problem.

Attempt to resolve the problem yourself

You can solve many problems without outside assistance by following the troubleshooting procedures that Lenovo provides in the online help or in the Lenovo product documentation. The online help also describes the diagnostic tests that you can perform. The documentation for most systems, operating systems, and programs contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the documentation for the operating system or program.

You can find the product documentation for your ThinkSystem products at the following location:

<https://pubs.lenovo.com/>

You can take these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system and any optional devices are turned on.
- Check for updated software, firmware, and operating-system device drivers for your Lenovo product. (See the following links) The Lenovo Warranty terms and conditions state that you, the owner of the Lenovo product, are responsible for maintaining and updating all software and firmware for the product (unless it is covered by an additional maintenance contract). Your service technician will request that you upgrade your software and firmware if the problem has a documented solution within a software upgrade.
 - Drivers and software downloads
 - <https://datacentersupport.lenovo.com/products/servers/thinksystem/sd650v3/7d7m/downloads/driver-list/>
 - Operating system support center
 - <https://datacentersupport.lenovo.com/solutions/server-os>
 - Operating system installing instructions
 - <https://pubs.lenovo.com/#os-installation>
- If you have installed new hardware or software in your environment, check <https://serverproven.lenovo.com> to make sure that the hardware and software are supported by your product.
- Refer to [Chapter 8 “Problem determination” on page 261](#) for instructions on isolating and solving issues.

- Go to <http://datacentersupport.lenovo.com> and check for information to help you solve the problem.

To find the Tech Tips available for your server:

1. Go to <http://datacentersupport.lenovo.com> and navigate to the support page for your server.
2. Click on **How To's** from the navigation pane.
3. Click **Article Type** → **Solution** from the drop-down menu.

Follow the on-screen instructions to choose the category for the problem that you are having.

- Check Lenovo Data Center Forum at https://forums.lenovo.com/t5/Datacenter-Systems/ct-p/sv_eg to see if someone else has encountered a similar problem.

Gathering information needed to call Support

If you require warranty service for your Lenovo product, the service technicians will be able to assist you more efficiently if you prepare the appropriate information before you call. You can also go to <http://datacentersupport.lenovo.com/warrantylookup> for more information about your product warranty.

Gather the following information to provide to the service technician. This data will help the service technician quickly provide a solution to your problem and ensure that you receive the level of service for which you might have contracted.

- Hardware and Software Maintenance agreement contract numbers, if applicable
- Machine type number (Lenovo 4-digit machine identifier). Machine type number can be found on the ID label, see “[Identify the solution and access the Lenovo XClarity Controller](#)” on page 25.
- Model number
- Serial number
- Current system UEFI and firmware levels
- Other pertinent information such as error messages and logs

As an alternative to calling Lenovo Support, you can go to <https://support.lenovo.com/servicerequest> to submit an Electronic Service Request. Submitting an Electronic Service Request will start the process of determining a solution to your problem by making the pertinent information available to the service technicians. The Lenovo service technicians can start working on your solution as soon as you have completed and submitted an Electronic Service Request.

Collecting service data

To clearly identify the root cause of a server issue or at the request of Lenovo Support, you might need collect service data that can be used for further analysis. Service data includes information such as event logs and hardware inventory.

Service data can be collected through the following tools:

- **Lenovo XClarity Provisioning Manager**

Use the Collect Service Data function of Lenovo XClarity Provisioning Manager to collect system service data. You can collect existing system log data or run a new diagnostic to collect new data.

- **Lenovo XClarity Controller**

You can use the Lenovo XClarity Controller web interface or the CLI to collect service data for the server. The file can be saved and sent to Lenovo Support.

- For more information about using the web interface to collect service data, see the “Backing up the BMC configuration” section in the XCC documentation compatible with your server at <https://pubs.lenovo.com/lxcc-overview/>.

- For more information about using the CLI to collect service data, see the “XCC `ffdc` command” section in the XCC documentation compatible with your server at <https://pubs.lenovo.com/lxcc-overview/>.

- **Lenovo XClarity Administrator**

Lenovo XClarity Administrator can be set up to collect and send diagnostic files automatically to Lenovo Support when certain serviceable events occur in Lenovo XClarity Administrator and the managed endpoints. You can choose to send diagnostic files to Lenovo Support using Call Home or to another service provider using SFTP. You can also manually collect diagnostic files, open a problem record, and send diagnostic files to the Lenovo Support.

You can find more information about setting up automatic problem notification within the Lenovo XClarity Administrator at http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/admin_setupcallhome.html.

- **Lenovo XClarity Essentials OneCLI**

Lenovo XClarity Essentials OneCLI has inventory application to collect service data. It can run both in-band and out-of-band. When running in-band within the host operating system on the server, OneCLI can collect information about the operating system, such as the operating system event log, in addition to the hardware service data.

To obtain service data, you can run the `getinfor` command. For more information about running the `getinfor`, see https://pubs.lenovo.com/lxce-onecli/onecli_r_getinfor_command.

Contacting Support

You can contact Support to obtain help for your issue.

You can receive hardware service through a Lenovo Authorized Service Provider. To locate a service provider authorized by Lenovo to provide warranty service, go to <https://datacentersupport.lenovo.com/serviceprovider> and use filter searching for different countries. For Lenovo support telephone numbers, see <https://datacentersupport.lenovo.com/supportphonenumber> for your region support details.

Appendix B. Documents and supports

This section provides handy documents, driver and firmware downloads, and support resources.

Documents download

This section provides introduction and download link for handy documents.

Documents

Download the following product documentations at:

https://pubs.lenovo.com/sd650-v3/pdf_files

- ***Rail Installation Guide for DW612S Enclosure***
 - Rail installation in a rack
- ***SD650 V3 Neptune DWC Tray User Guide***
 - Complete overview, system configuration, hardware components replacing, and troubleshooting.
- ***SD650 V3 and SD650-I V3 Messages and Codes Reference***
 - XClarity Controller, LXPM, and uEFI events
- ***UEFI Manual***
 - UEFI setting introduction

Notes: SD665 V3 tray can be installed in the DW612S 6U enclosure, which can be installed in the ThinkSystem Heavy Duty Full Depth Rack Cabinets. The documentations below are available for download:

- *DW612S Enclosure User Guide*
- *ThinkSystem Heavy Duty Full Depth Rack Cabinets User Guide*

Support websites

This section provides driver and firmware downloads and support resources.

- Drivers and Software download website
 - <https://datacentersupport.lenovo.com/products/servers/thinksystem/sd650v3/7d7m/downloads/driver-list/>
- https://forums.lenovo.com/t5/Datacenter-Systems/ct-p/sv_eg
- Lenovo Data Center Support
 - <https://datacentersupport.lenovo.com/products/servers/thinksystem/sd650v3/7d7m>
- <https://datacentersupport.lenovo.com/documents/Invo-eula>
- <https://lenovopress.lenovo.com/> (Product Guides/Datasheets/White papers)
- <https://www.lenovo.com/privacy>
- https://datacentersupport.lenovo.com/product_security/home
- <http://datacentersupport.lenovo.com/warrantylookup>
- <https://datacentersupport.lenovo.com/solutions/server-os>
- <https://serverproven.lenovo.com> (Options compatibility lookup)
- <https://pubs.lenovo.com/#os-installation>

- <https://support.lenovo.com/servicerequest> (Service request)
- <https://datacentersupport.lenovo.com/solutions/ht509500> (Stay up to date on firmware updates)

Appendix C. Notices

Lenovo may not offer the products, services, or features discussed in this document in all countries. Consult your local Lenovo representative for information on the products and services currently available in your area.

Any reference to a Lenovo product, program, or service is not intended to state or imply that only that Lenovo product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any Lenovo intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any other product, program, or service.

Lenovo may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document is not an offer and does not provide a license under any patents or patent applications. You can send inquiries in writing to the following:

*Lenovo (United States), Inc.
8001 Development Drive
Morrisville, NC 27560
U.S.A.
Attention: Lenovo Director of Licensing*

LENOVO PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some jurisdictions do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. Lenovo may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

The products described in this document are not intended for use in implantation or other life support applications where malfunction may result in injury or death to persons. The information contained in this document does not affect or change Lenovo product specifications or warranties. Nothing in this document shall operate as an express or implied license or indemnity under the intellectual property rights of Lenovo or third parties. All information contained in this document was obtained in specific environments and is presented as an illustration. The result obtained in other operating environments may vary.

Lenovo may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Any references in this publication to non-Lenovo Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this Lenovo product, and use of those Web sites is at your own risk.

Any performance data contained herein was determined in a controlled environment. Therefore, the result obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurements may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

Trademarks

LENOVO and THINKSYSTEM are trademarks of Lenovo.

All other trademarks are the property of their respective owners.

Important notes

Processor speed indicates the internal clock speed of the processor; other factors also affect application performance.

CD or DVD drive speed is the variable read rate. Actual speeds vary and are often less than the possible maximum.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for 1 024 bytes, MB stands for 1 048 576 bytes, and GB stands for 1 073 741 824 bytes.

When referring to hard disk drive capacity or communications volume, MB stands for 1 000 000 bytes, and GB stands for 1 000 000 000 bytes. Total user-accessible capacity can vary depending on operating environments.

Maximum internal hard disk drive capacities assume the replacement of any standard hard disk drives and population of all hard-disk-drive bays with the largest currently supported drives that are available from Lenovo.

Maximum memory might require replacement of the standard memory with an optional memory module.

Each solid-state memory cell has an intrinsic, finite number of write cycles that the cell can incur. Therefore, a solid-state device has a maximum number of write cycles that it can be subjected to, expressed as total bytes written (TBW). A device that has exceeded this limit might fail to respond to system-generated commands or might be incapable of being written to. Lenovo is not responsible for replacement of a device that has exceeded its maximum guaranteed number of program/erase cycles, as documented in the Official Published Specifications for the device.

Lenovo makes no representations or warranties with respect to non-Lenovo products. Support (if any) for the non-Lenovo products is provided by the third party, not Lenovo.

Some software might differ from its retail version (if available) and might not include user manuals or all program functionality.

Electronic emission notices

When you attach a monitor to the equipment, you must use the designated monitor cable and any interference suppression devices that are supplied with the monitor.

Additional electronic emissions notices are available at:

https://pubs.lenovo.com/important_notices/

Taiwan region BSMI RoHS declaration

單元 Unit	限用物質及其化學符號 Restricted substances and its chemical symbols					
	鉛Lead (Pb)	汞Mercury (Hg)	鎘Cadmium (Cd)	六價鉻 Hexavalent chromium (Cr ⁶⁺)	多溴聯苯 Polybrominated biphenyls (PBB)	多溴二苯醚 Polybrominated diphenyl ethers (PBDE)
機架	—	○	○	○	○	○
外部蓋板	—	○	○	○	○	○
機械組零件	—	○	○	○	○	○
空氣傳動設備	—	○	○	○	○	○
冷卻組零件	—	○	○	○	○	○
內存模組	—	○	○	○	○	○
處理器模組	—	○	○	○	○	○
電纜組零件	—	○	○	○	○	○
儲備設備	—	○	○	○	○	○
印刷電路板	—	○	○	○	○	○
<p>備考1. “超出0.1 wt %” 及 “超出0.01 wt %” 係指限用物質之百分比含量超出百分比含量基準值。 Note1 : “exceeding 0.1wt%” and “exceeding 0.01 wt%” indicate that the percentage content of the restricted substance exceeds the reference percentage value of presence condition.</p> <p>備考2. “○” 係指該項限用物質之百分比含量未超出百分比含量基準值。 Note2 : “○” indicates that the percentage content of the restricted substance does not exceed the percentage of reference value of presence.</p> <p>備考3. “—” 係指該項限用物質為排除項目。 Note3 : The “—” indicates that the restricted substance corresponds to the exemption.</p>						

Taiwan Region import and export contact information

Contacts are available for Taiwan Region import and export information.

委製商/進口商名稱: 台灣聯想環球科技股份有限公司
進口商地址: 台北市南港區三重路 66 號 8 樓
進口商電話: 0800-000-702

